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Implications of Introducing the IIT Mandi to the Rural Kamand Region

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IMPLICATIONS OF INTRODUCING THE IIT MANDI TO THE RURAL KAMAND REGION



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Indian Institute of
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Abstract

The new Indian Institute of Technology (IIT) Mandi is currently under construction in a rural region of Himachal Pradesh. The consequences of such development will impact the social fabric, economy, and environment of the surrounding region. This project examined the impacts that the IIT will have on the surrounding villages. We used a qualitative approach in gathering data by conducting open-ended interviews with villagers, students, faculty, staff, and administrators. Respondents reported an overwhelming sense of optimism amongst the villagers who believe that the IIT will solve a majority of their problems or otherwise improve their life. Our findings and analysis, indicate that the villagers are not fully aware of the scope of construction of the IIT. We made recommendations to the IIT focused on better communication and cooperation with the villages with the purpose of amplifying positive effects while mitigating negative ones.

CONTRIBUTION PAGE

Kanv Garg, Sampath Kumar, Brianna Mikolich, Fiona Ogren, Justin Rice, Mahesh Yadav all contributed to the completion of this project. Below is summarized each member's contributions.

Mr. Garg contributed to the translation of the interviews conducted; to the analysis, conclusions, and recommendations; to development of the economic theory section of the Literature Review; the gathering of quantitative economic data; and the recording of stories.

Mr. Kumar contributed his time for a few interviews, including those conducted at the villages of Siram and Neri, as well as at the Government School in Kamand; and some preliminary interviews to contribute to our accumulation of social and cultural knowledge of the region.

Ms. Mikolich was present at each interview and contributed by writing the economic sections of this paper; writing, editing, and formatting throughout all sections of the document; and the creation of the infographic.

Ms. Ogren was present at each interview and contributed by writing the environmental sections; writing, editing, and formatting throughout all sections of the document; making the map of Kamand valley and all of the charts; helping to create the infographic and poster.

Mr. Rice was present at each interview and contributed by writing the socio-cultural sections; writing, editing, and formatting throughout all sections of the paper; and helping to create the infographic.

Mr. Yadav was present at each interview and acted as interviewer and translator, he contributed by recording stories; doing research and writing in the environmental sections; editing to ensure that all content was accurate; and creating the tree diagram, included on the poster, to explain the impacts of the IIT Mandi in a graphic way.

EXECUTIVE SUMMARY

INTRODUCTION AND BACKGROUND

The Kamand valley, in Mandi District, Himachal Pradesh, India, is a very rural area with only one major road. This road, Major District Road (MDR) 23, passes through small villages and crosses the Uhl River that flows through the valley. In 2010, a new Indian Institute of Technology began construction on 531-acres of the valley alongside a stream that flows into the Uhl River. The facility will eventually hold 6000 students, supported by over 600 faculty.

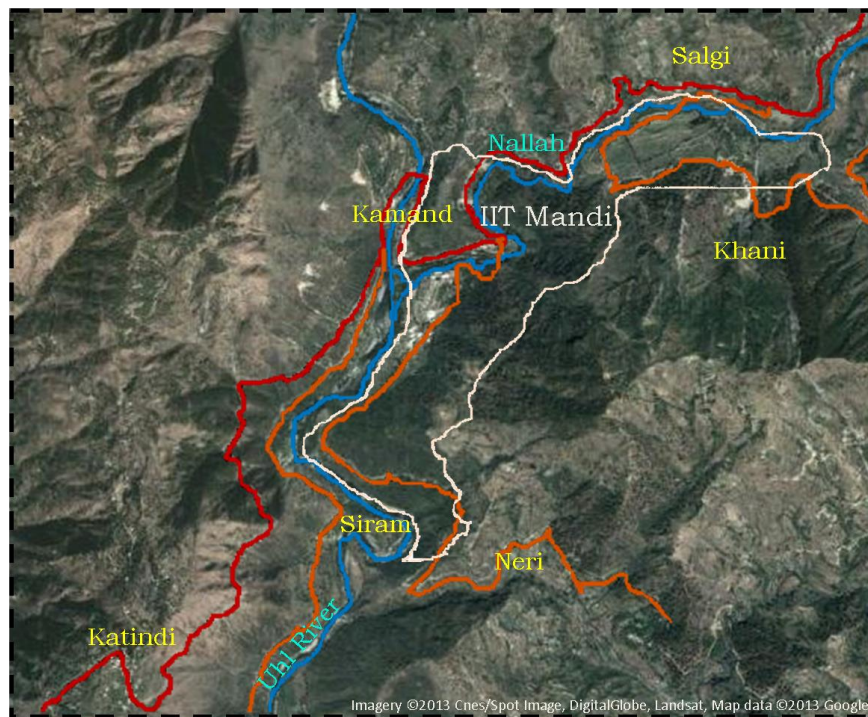


FIGURE A: KAMAND VALLEY AND THE LOCAL VILLAGES

The project's goal was to understand the potential impacts of the IIT Mandi on the Kamand valley and make recommendations to the IIT based on our findings. To pursue this goal, the team evaluated the impacts in terms of socio-cultural, economic, and environmental concerns. The IIT will bring students and faculty from all over the world. They will bring with them different languages and cultures to the secluded and traditional culture of Kamand. Local villagers or people from outside the valley would like to fill jobs that follow the introduction of the IIT, in both construction and operation. These new buildings and the large infrastructural development, along with the large influx of population, will have consequences on the valley. Though the team considered socio-cultural, economic, and environmental concerns separately, it also acknowledged that they are all interconnected and in the final analysis must be considered as a whole.

METHODOLOGY

Our objectives were:

To record local perceptions of socio-cultural, economic, and environmental change from individuals that reside and work in the Kamand region.

To document a few of the indicators of change, threats, and benefits to the society, economy, and environment in the Kamand region.

Create a tool to help visualize impacts and make policy recommendations for the IIT that will amplify the positive impacts and mitigate any negative impacts that the IIT has on the community and environment in the Kamand region.

We interviewed local residents of the valley, including villagers, students, faculty, staff, and administrators of the IIT to gain insight as to what the valley was like, what it is currently like, any changes they have perceived, and their thoughts on the future of the valley. We asked questions about socio-cultural, economic, and environmental change, but largely made our questions open-ended to avoid steering the data to any particular conclusions. Once we had recorded the data from our interviews, we documented and confirmed the validity of these indicators with photographs and site assessments.



FIGURE B: THE TEAM CONDUCTING AN INTERVIEW IN KAMAND VILLAGE

FINDINGS

Below we present our findings in three sections, socio-cultural, economic, and environmental findings, followed by our analysis.

SOCIO-CULTURAL FINDINGS

Quality of education for local children.

All villagers that we interviewed whose villages used the Kamand government school for all schooling, or just above 7th grade, were unsatisfied with the quality of the school or with its proximity to their home. Furthermore, some villagers were sending their children to private schools in Mandi City to avoid interaction with the Kamand government school. Villagers hoped that the IIT would either upgrade the educational environment in the valley, or introduce a private school that their children would be welcome to attend.

Road capacity and improvements.

MDR 23, the main road from Mandi through the IIT, has experienced a significant increase in traffic from hourly student transport buses. Other than this periodic traffic, construction materials carried over this road creates more traffic. Upon asking villagers in the Kamand village, which MDR 23 runs through, about this increase, they said that they did notice and that the government had told them that they would widen the roads to accommodate for the increase (Kamand 2, Sept. 11, 2013). Salgi village, on the other hand, is located near North campus and has yet to notice any significant traffic increase (Salgi 1, Sept. 13, 2013). Lastly, Siram, which is not on the main road, had not seen any extra traffic.

ECONOMIC FINDINGS

Opportunities for employment at the IIT.

The IIT is hiring some of the local villagers as construction workers and security personnel (Siram 1, 2, 3, Sept.19, 2013 & Salgi 2, Sept.13, 2013). The first construction phase of the campus required approximately 150-200 jobs per day which the contractor hired people from around Katindi village to complete (Katindi 2, Sept 30, 2013). The issue the people are having with jobs like these is that they are not consistent. The contracts for construction and even security only assure work for a few months at a time, which makes it hard for the villagers to make a living all throughout the year (Katindi 1, Sept 30, 2013 & Kamand 4, Sept. 21, 2013).

The villagers perceive that the number of people from outside the valley receiving jobs is higher than the number of local residents. The residents of all the villages we visited want the IIT to offer them job preference. In particular, persons in the village of Salgi want the IIT to consider outsiders for employment only in the case that local villagers are not qualified for the job (Salgi 2, 4, Sept.13, 2013).

Even though people within the villages have skills, they often feel that they miss opportunities at the IIT because of a lack of advertisement within the Kamand region. By the time that the residents hear of job openings, the IIT has already filled the positions. The villagers want to meet with a higher authority of the IIT so the Kamand Valley Development Society, the local union, can plead their case (Salgi 4, Sept.13, 2013).

ENVIRONMENTAL FINDINGS

The IIT stands in the position to not only introduce huge amounts of additional solid and sewage waste, but also to provide a waste management solution for the entire valley.

When interviewing local residents, we asked them to tell us how they dispose of their waste. We received different responses depending on where the individuals lived. Residents in the communities of Kamand and Salgi, upstream from the campus, throw waste directly into the river, because there is nowhere else for it to go. Downstream from the campus however, residents of the community of Siram responded that they did not throw their waste directly into the river, but instead throw it onto the hill, because they know that other communities downstream use the water. The consensus among all interviewees was that they regret throwing their waste into the river and they were only doing so because no other option exists. Furthermore, they would like to see a waste management system implemented in the area, possibly by the IIT, and they would use it if it existed.

Parallel with the responses about waste disposal, when asked if they had noticed any increase in waste since construction of the IIT began, answers varied between communities upstream and downstream from the IIT. Upstream, residents responded that they had not noticed any increase in waste. Downstream, one group of interviewees from Siram noted that they had noticed an increase in sewage and construction waste in the river. Furthermore, one interviewee, who had worked on the construction of the campus, said that much, if not all, of the construction waste and waste from the workers' camp went directly to the river (Siram 1, Sept.18, 2013).

The destruction of natural habitats due to construction of the IIT will displace indigenous wildlife populations, possibly with serious consequences.

The IIT is having an impact on forestry, just by the nature of building structures and an increase in noise, not to mention the cutting down of trees or the leveling of terraces. The destruction of natural habitats in the area will displace many animal populations. As much as the IIT has a plan to avoid cutting down excessive numbers of trees, the act of building the campus is nevertheless displacing wildlife. This displacement can become an issue for the people in the surrounding region, as the wildlife might migrate closer to villages and destroy crops, and threaten the safety of both the human and animal populations. The shifting of wildlife populations interferes with ecosystem dynamics and could damage wildlife populations, as the proximity to human settlements endangers more animals.

ANALYSIS

As we conducted our interviews, an overwhelming sense of optimism seemed to prevail within the communities. Seen as a 'beacon of hope', many people genuinely believe that the IIT coming into the valley is going to solve most, if not all, of their problems. Instead of focusing on possible negative impacts that the IIT could have on their way of life, they are quick to see all of the benefits the IIT could bring to their communities. We believe it is possible that the villagers have not thought about the total scope of the IIT, as only a small portion is constructed, and this is the main reason they see no negative impacts. Many villagers, especially in Salgi, where construction has yet to start, seem to lack

awareness of the scale of the construction. Whether this is due to lack of communication between the IIT and the communities or the fact that no construction has begun and nothing has changed yet, is hard to tell.

The communities of the Kamand valley exhibit several indicators of social and economic vulnerability. The communities are generally remote, with no more than a few hundred residents at most. They are predominantly agrarian, and with the cost of land in the area increasing dramatically due to the development of the IIT, the latest in a long history of land cession, first to the Animal Husbandry Department, and now to the IIT, they are rapidly losing the land that they rely on for their livelihoods. These factors have made the communities in Kamand vulnerable, however, their strong cultural and familial bonds help to provide some offset.

As a whole, the village stakeholders seem to believe that while the IIT will solve their problems, all of their traditions and the positive aspects of their way of life will remain mostly unchanged. This demonstrates some degree of perceived social and cultural resilience. While they may exhibit several indicators of social, economic, and environmental stress, their determination as a group that they will remain unified by their culture increases their overall resistance to some changes that the IIT will undoubtedly bring.

RECOMMENDATIONS

We have established three broad areas of recommendation for the IIT based on our findings and analysis:

Cooperate and communicate with the communities in the Kamand valley to develop a mutually beneficial relationship.

Strive to develop regional culture and environmental awareness, through educational programs and policies, within the university.

Continue to implement socially, economically, and environmentally sustainable practices that extend beyond the university.

COOPERATION AND COMMUNICATION

The most important recommendation that we can make is that the IIT and the local communities establish consistent communication that will encourage cooperation. In order to facilitate this communication, we recommend that the IIT and the surrounding communities establish a two-part scheme. Occasional meetings for communication and more frequent meetings for evaluation of concerns and to implement solutions. More specifically, these would take the following forms:

- A town hall meeting to voice concerns open to community members, with the Director, upper-level administrators, and all members of the committee in attendance. This could occur every four months, or approximately once per semester.

- A meeting every two months, of a committee made up of faculty from various disciplines, administrators, and village heads, to implement solutions to problems and to evaluate the progress on implementations.

AWARENESS AND EDUCATION

The IIT could continue to develop its effort to create a sustainable campus. To have a truly sustainable campus, the campus residents can support the institute's goals. Educating them as to how they can play a part in contributing to the success of these goals will go a long way. In this light, we feel that the IIT would greatly benefit by sharing this vision with students, faculty and staff, and construction workers.

Education for the students that focuses on cultural awareness could promote sustainable relations with the villages. Students would be less likely to offend the villagers if they are aware of local customs or taboos. One way to educate members of the IIT as well as create a healthy community relationship with the villages is to hold cultural or religious festivals on campus green space. Additionally, the institute could provide a cultural orientation program to students at the beginning of their freshman year.

GOALS OF A SUSTAINABLE CAMPUS

In order for the IIT to meet its goals of becoming a sustainable campus, ensuring that they become sustainable in all aspects is important. These aspects include social, economic, and environmental considerations. Below we listed some key considerations that we feel the IIT could support as part of its plan.

- Prioritize a sewage and chemical waste management system.
- Prioritize the establishment of a waste management system on campus.
- Prioritize the employment of qualified area residents.
- Try to buy local produce and dairy products.
- Take care to be mindful of sacred sites located in and around campus, especially around North campus.

CONCLUSION

This project examined the potential changes and consequences for the Kamand region due to the establishment of the new IIT Mandi campus at Kamand. Beyond just fulfilling a project requirement for graduation, this project was the result of a collaborative experience between students from the IIT Mandi and WPI. Our work proves that the richness of the IIT will be strengthened by all increased diversity and collaboration.

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CHAPTER 1: INTRODUCTION

In 2009, construction began on the first Indian Institute of Technology (IIT) in the state of Himachal Pradesh; the IIT Mandi. Though currently housing about 500 hundred students and 50 faculty and staff, the development of the university will bring an estimated 6000 students and 600 faculty and staff to the rural Kamand region (Arti Kashyap, personal communication, 8 April 2013). This new IIT has a mission focused on the principles of creating a just and sustainable India (IIT Mandi, 2011). In order to contribute to these goals, this project will conduct an impact assessment that investigates the effect of the new IIT campus on the social and cultural life of the people of the Kamand area, as well as on the environmental and economic health of the region.

The new IIT is located 14 kilometers northeast of Mandi city in the Kamand area of Himachal Pradesh. Named after one of the larger villages in the area, the Kamand region, populated with thousands of people, is comprised of “patches” of settled crop-livestock mixed farming (Sernwall, 2004). Many villages are scattered around the hills and valleys in the foothills of the Himalayan Mountain Range. These villages are scattered across many administrative districts, but are similar and thus unified as part of the Kamand area (Arti Kashyap, personal communication, 8 April 2013).

The rural setting of the Kamand valley is ripe for social change with the introduction of an IIT. With an eventual population of over 6000 people, the IIT will have a large influence over the lives of the people in the valley. The IIT will bring with it infrastructural changes as well as a huge link to the outside world. Students from all over India will come into the valley and will bring their varying cultures and social values.

The development of a new campus on the agricultural land in the Kamand area will change the ecology of the valley. Before construction started on the IIT, Care Earth Trust conducted an early baseline study that focused on ecological features of the valley that were most likely to change (*Eco-Report*, 2010). With construction now underway, this impact could take numerous forms, some of which may not have been initially apparent.

The campus itself, no matter how sustainable the building designs, will still alter the landscape and ecology of the region and draw upon local resources.

Development in the region may compromise significant topographic and ecological features in the valley. The IIT will likely affect the Beas River, an important river that flows through Mandi district. A major tributary, the Uhl River, flows along the new campus. A stream that runs into the Uhl, the Kataula ki Khad flows directly through the campus. The Kataula ki Khad flows with water that runs off from the mountains. This feature makes it a Nallah. The Nallah does not always flow into the Uhl or the Uhl into the Beas. Monsoon season is the only guaranteed time that all of the rivers will flow together. Given the complex nature of the waterways, the potential for pollution of the rivers is just one impact to consider. Waste is an important factor that the IIT must manage in order to prevent pollution. During the months of monsoon season, treated wastewater dumped into the Nallah will eventually flow to the Indus River and then the Indian Ocean. However, the wastewater will have to be strategically stored for the rest of the year (*Eco-Report*, 2010). Due to the focus on sustainability for the campus, the potential for positive environmental impacts exists as well. In particular, the campus may model, and inspire the villages in the surrounding area to adopt, more sustainable practices.

The introduction of new jobs and a new population has the potential to alter the economy. Prior to the introduction of the IIT, the Animal Husbandry Department (AHD) of Himachal Pradesh managed much of the land in the region for agricultural use. New employment opportunities on campus could cause local residents to leave their agricultural jobs, expand their pre-existing shops, start producing more crops to sell to the IIT, or close their businesses to take up jobs at the university. On the other hand, the university also brings job opportunities to the highly educated members of the region, so villagers with specialized skills will have opportunities for higher income jobs, thus producing a positive effect on the economy.

The impact of the new IIT campus at Mandi will serve as a reminder of the interconnectivity of community, economy, and environment. With this in mind, we did not observe any factor as an isolated set of influences but instead we assessed it as it pertains

to the system as a whole. The goal of this project is therefore to understand potential changes and consequences for the Kamand region due to the introduction to the IIT Mandi. Our first objective is to record local perceptions. Our second objective is to document indicators of change, threats, and benefits from the IIT Mandi on the Kamand region. Our third objective is to make policy recommendations to the IIT that will directly benefit the relationship between the IIT and the community and environment of the Kamand region.

CHAPTER 2: LITERATURE REVIEW

“An impact can be defined as any change in the physical, chemical, biological, cultural or socio-economic environmental system as a result of activities relating to a project.”

(Anjaneyulu et al., 2007)

In this chapter, we present the background for the project and the site in addition to exploring the possible impacts of the campus as well as the vulnerabilities of the surrounding community. We examine the potential consequences of the development of the IIT Mandi on the society, economy, and environment of the Kamand region, and we review several standard indicators of socio-economic and environmental change in order to understand the possible implications of introducing a world-renowned university into a rural community.

In the context of this project, we define impact as the changes and consequences as perceived by the local population. We did not conduct a formal impact assessment, as the scope was too large to complete in our allotted 7 week time period. Based upon discussion and local insight, we evaluated the changes and consequences brought by the IIT. Due to its remote setting, there is a gap in information about the Kamand region. Since we had limited knowledge of the baseline conditions of the area, this had to be determined on site. The literature review synthesizes information from sources either directly about the Kamand region, or more likely, from case studies in communities with similar situations. This information helped us to identify the most commonly reported issues during our initial site assessment.

2.1 SITE DESCRIPTION

Himachal Pradesh, a state in northern India, is located in the foothills of the Himalayas. It has an area of approximately 56 thousand square kilometers and a population of about 6.9 million (*Himachal at a Glance*, 2013). Although the Himalayas cover only about 18% of India’s geographical area, they hold over 50% of India’s forests and 40% of the species that are endemic to India (Sernwal, 2004). The Mandi District itself has an

approximate area of 4 thousand square kilometers and a population of about 0.9 million (*Development Plan-Mandi, 2002*).

Mandi itself is a very diverse district that is comprised of residents from different cultures and backgrounds. Though the primary religion is Hinduism, there are also significant populations of Muslims, Sikhs, and Buddhists living in the district. The female to male ratio in the district is very close, as the last census data for the entire district shows that there were on average 974 females to 1000 males. Finally, the 2011 census indicates good access to education, with a literacy rate of 86.3% in Himachal Pradesh (*Development Plan-Mandi, 2002; State Profile, 2012*).

The economy in Mandi is predominantly agrarian. Of the total population, 79% is dependent upon agriculture and other rural occupations as a source of income. The inhabitants of the Kamand region rely on farming and livestock as their means of trade. Although the cultivation of crops is mainly for self-consumption, neighboring communities, cities, and states serve as a market for bartering surplus crop (Sarkar, 2011).

Mandi district grows many crops including wheat, vegetables, apples, citrus, maize, and rice. Jobs that are within the agricultural economy, yet are not farming, include herding livestock and collecting fodder. There is a market for apple concentrate, jams, wine, beer, pickles, and dried fruits. A milk processing plant, about 20 kilometers outside of Mandi city, produces 5000-6000 liters of milk daily and employs many local residents (*Development Plan-Mandi, 2002*).

Animal husbandry is also common throughout the district. In a district level analysis of the regional dimensions of the livestock economy, a study in 2004, there were approximately 92 animals per square kilometer (Virender, 2004). This study identified an increase in the number of livestock per square kilometer, and a shift from cattle and sheep to water buffalo and goats. Cattle are present in the rural economy because of their many uses (see figure 1 below). Cattle produce milk for the community or ghee, for sale in the markets. Sheep and goats provide wool for the prevalent textile industries in Mandi.



FIGURE 1: COWS, A PEDESTRIAN, AND A MOTORCYCLIST CROSSING THE BRIDGE TO NORTH CAMPUS.
PHOTO CREDIT: JUSTIN RICE

Modern agricultural technology reduces the number of workers required on farms. This reduction in jobs has the potential to put people out of work, or cause them to migrate to more urban areas. However, the Mahatma Gandhi National Rural Employment Guarantee Act ensures employment within the rural areas. Under this Act, the government provides work for 100 days on projects such as the widening or building of roads (Shome, 2011; Sharma, 2004).

Before IIT Mandi acquired the land on which it is situated, the state run Animal Husbandry Department had a farm, which was supposed to help foster innovation of agricultural practices in Himachal Pradesh. Focusing mainly on promoting better breeds of cattle and modern methods of tractor farming, the Animal Husbandry Department investigated ways that would cater to the daily needs of the people of Kamand. Unfortunately, the village communities did not benefit much from this research, and the IIT acquired the department land when the Animal Husbandry Department left the valley (Sarkar, 2011).

One non-agrarian source of employment in the region is associated with tourism. Tourists stay in Mandi to visit the numerous temples, finding the area a good stopping

point on their way north to Manali and other more popular tourist destinations. To accommodate these tourists there are hotels and guesthouses. The Himachal Pradesh Tourism Policy of 2005 encourages investment in the tourism business by providing incentives such as income tax exemption (*State Profile*, 2012; Tourism Policy, 2005).

Other employment options include the textile industry, government jobs including banking and education, and small services. Almost every village has at least one shop that stocks urban goods and basic grocery needs. These shops are satellites of wholesale distributors from the cities (Sarkar, 2011). Small restaurants, or ‘dhabas’, have also been established along major district road (MDR) 23 to cater to the demand for non-vegetarian foods and tea (Sarkar, 2011). As the seat of the Mandi District, Mandi city offers all forms of services, shops, and products to support the region.

2.2 IIT MANDI

The new IIT Mandi, currently under construction on a 531- acre campus, is approximately 14 kilometers northeast of Mandi town along the river Uhl and the MDR 23 (Sarkar, 2011). Of the 531 acres allotted to the campus, 300 acres are forestland and 7.54 acres are dense forest (*Indian Express*, 2011). Before construction could begin, The Forest Department cleared the campus for diversion of forestland. Clearance was on the condition that only landscaping and beautification, but not construction, would happen on the dense forestland (Urmi, 2011). Previously, local farmers associated with the Animal Husbandry Department used the open land for grazing and agroforestry by (*Eco Report*, 2010). Now, even though the IIT owns the land, the local farmers are still using it for grazing their cattle and for access to their homes.

Sustainability, in a broad sense, has been part of the IIT Mandi mission statement from the start. In his Director’s Speech on the 9th of March 2013, Dr. T. A. Gonsalves, director of IIT Mandi, stated that the vision of the university includes “working for the benefit of all segments of society. Especially the rural and Himalayan population who are relatively at a disadvantage” (Gonsalves, 2013). IIT Mandi, constructed in part from prefabricated buildings transported to the campus, will have a minimal impact on the

environment. The university also made an attempt to build in the traditional architectural style of the region. These influences are clear from the renovation of Animal Husbandry buildings into faculty housing and administrative offices.

Although the IIT has made its intention to be a sustainable campus clear in an environmental sense, ideas for sustainability as it pertains to the local economy and society are also emerging. With this in mind, the IIT started the Center for Innovative Technologies for the region. This hub of technological advances has a goal to deploy, in conjunction with local businesses, cost-effective technological solutions to common problems in the area (Gonsalves, 2013). The university also implements a program with the regional government schools in which IIT students are available to tutor in the fields of science and technology (Arti Kashyap, personal communication, 8 April 2013).

2.3 MEASURING SOCIO-CULTURAL, ECONOMIC, AND ENVIRONMENTAL IMPACT

A variety of perspectives allow measurement and deep evaluation of impact, but it is important to establish core categories that best describe sets of stress or consequence indicators. To simplify, we determined that the socio-cultural, economic, and environmental data would give the broadest picture of change in the region. Here we clarify our understanding of socio-cultural, economic, and environmental vulnerability as it pertains to this part of Himachal Pradesh.

2.3.1 SOCIO-CULTURAL IMPACT

Cultural values that the people of villages in the Himalaya have developed influence their social structure. The IIT will bring people from all across India that will have different social and cultural values that may pressure traditional values in the region. Because social values and culture are so closely knit they may not change due to the IIT or they may turn around completely. In this part of the world, geography plays an important role in shaping the values of the local people (Chetan, 2006). Exploration of this theme will bring true appreciation to the differences that construction will bring

Geographically, the terrain creates micro-cultures because of isolation. The state of Himachal Pradesh provides an apt example for highlighting the interaction between geographical conditions, cultural practices, and political development. Geographical isolation has shaped political territories and dictated the domains of religious deities. Within the scope of religious organization, the geography of Himachal has influenced the development of local deities, networked in a strict hierarchy reaching from the political capital in Shimla to the most rural villages. This hierarchy, in turn, has dictated the moral and social structures of the region. While the hierarchy of deities has historically been rigid, rapid social change in villages has occasionally forced their reordering (Chetan, 2006).



FIGURE 2: TEMPLE IN KAMAND VILLAGE. PHOTO CREDIT: FIONA OGREN

When a new infrastructure and population like the IIT community moves into an area, it can have a range of impacts, depending on the capacity of the people. Ignorance of local cultural practices on the part of the newcomers can be a nuisance to local residents or even cause real damage. The Kamand area will experience a population influx as the campus grows. Though there will not necessarily be new residents in the villages, the region will have a larger population with increased diversity. To determine the capacity of the people of Kamand to handle the pressure of a new population and infrastructure, we explored certain indicators. The capacity is based on the social vulnerability of the people, the more resilient the people are the less the chance that they will be adversely impacted.

The United Nations Department of Economic and Social Affairs broadly categorizes indicators of both economic and social vulnerability into a shock index and an exposure index. From those criteria, the vulnerability indicators that tend to have the greatest impact on rural communities are remoteness; share of agriculture, forestry, and fisheries; and instability of agricultural production (Guillaumont, 2011) (see figure 3, below).

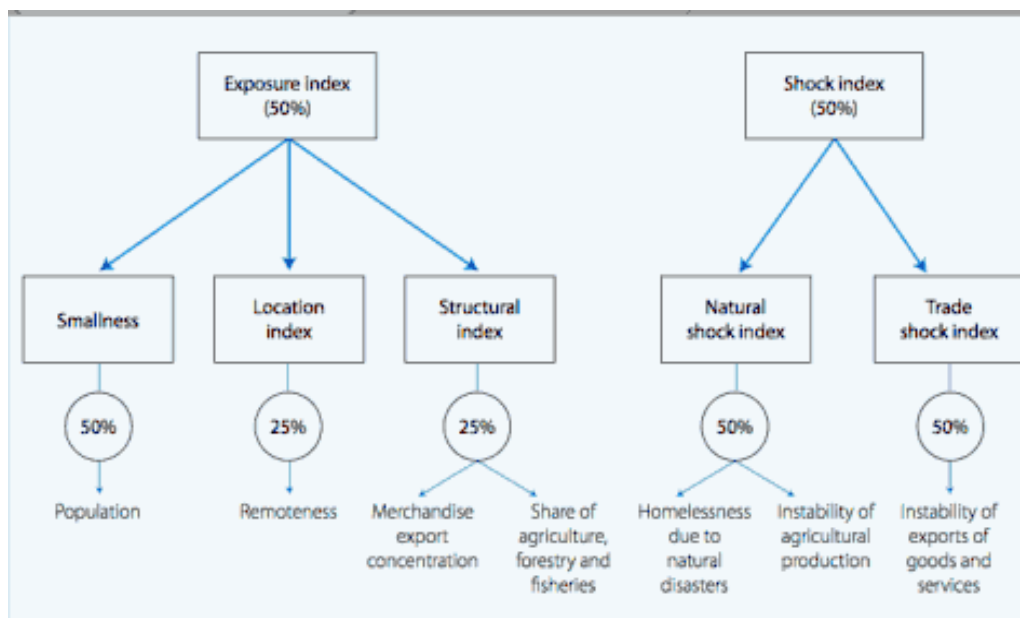


FIGURE 3: ECONOMIC VULNERABILITY CHART: THE CONCEPT OF STRUCTURAL ECONOMIC VULNERABILITY AS RELATED TO DEVELOPING COUNTRIES (GUILLAUMONT, 2011).

The idea of a Vulnerability and Capacity Assessment (VCA) came about in the late 1970s when development organizations realized the importance of these two factors. They realized that to have the greatest positive effects on the area they were going into they would have to understand what the area really needed based on what the local people thought (UNICEF, 2007). In 1989, Mary Anderson and Peter Woodrow published a book that took the ideas of a VCA and created guidelines to carry them out properly. They called this technique a Capacities and Vulnerability Analysis (CVA) (UNICEF, 2007). The CVA technique analyzes the physical, material, and social relationships that contribute to capacity and vulnerability. Anderson and Woodrow's book focuses on applying CVA to natural disasters, but it also has applications in other situations (Walker, 1999).

Anderson and Woodrow break communal vulnerabilities and capacities into three categories: physical/material, social/organizational, and attitudinal/motivational. Poverty is one of the most damaging physical vulnerabilities. A change in the overall situation in a region can demand people to adapt to keep up, but those who are poor may have a very difficult time if the change requires them to have extra money. This could be particularly pertinent in this case if land value in the region rises and residents can no longer afford to stay on their land. Socially, the more united the people, the more resilient they seem to be to change. This unity can come from a political party, caste, or religion. The people's attitude forms the last key vulnerability. Individuals that are willing to embrace change or have mindset that they will make it through, tend to do so (Anderson et al., 1990).

2.3.2 ECONOMIC IMPACT

In Kamand, villagers make a living off of variety of occupations, and the IIT has the potential to bring both new options for employment and improve old ones. Most residents are engaged in agricultural activities and non-agrarian jobs are usually governmental, small business or service sector. The governmental jobs, including banking and education, are not always local to the Kamand region. These employees have to travel elsewhere in Mandi District to earn their living. The introduction of this campus will create many local employment opportunities to offset some of this migration (Arti Kashyap, personal communication, 8 April 2013). In her paper on the Kamand region, Rinki Sarkar notes that

the locals see the new campus as a potential dairy product market. Job opportunities for the educated will also become available. Because of the IIT, the local people believe that accessibility and better road conditions will benefit their trade (Sarkar, 2011).

The IIT will face the challenge of feeding the new population of students, tourists, and workers that it attracts. Currently, the campus buys most of its food from the local markets, which source food from both local farms and areas farther afield (Arti Kashyap, personal communication, 8 April 2013). As the campus population grows, it is unclear how well the IIT can rely on local production, and this may no longer be a sustainable model for the IIT. Food production planning will help to assess if locally produced food could supply the college, or if food importation from other parts of India is necessary.



FIGURE 4: DRYING PEPPERS IN NERI. PHOTO CREDIT: JUSTIN RICE

The new IIT campus will bring in a new and larger population that will have an effect on the job market. From students, visitors, and faculty, the population of Mandi District is going to increase. According to Director T. A. Gonsalves, the economy of Mandi is 'flourishing' as local people hired for construction jobs as well as other operations on campus have a new source of income (Gonsalves, 2013). In Virginia, USA, the introduction of the Chattanooga campus of Virginia College to the community in Brainerd caused a

similar optimistic outlook on the impact of the new campus. The additional population that this campus drew in filled job vacancies in the healthcare and business fields (Angie, 2006).

During the late 1980s and 90s, Italy experienced an increase in local innovation, coinciding with the development of new universities. A study, carried out to assess the impact of these collegiate developments on the rate of local industrial innovation, found that regions with lower average income benefited the most from the establishment of a university in their communities. It also noted that the establishment of a new university in a region noticeably tended to increase industry as well as research and development activities, particularly in less industrialized areas. The primary indicator of this development was the increase in industrial patents filed in the region (Cowan & Zinovyeva, 2013).

As much as qualitative data is useful to understand the economic impact that the IIT may bring to the Kamand region, to understand the whole picture, one can also undertake a quantitative analysis. The general divisions of quantitative analysis of the economic impact include the expenditure impact, the human development impact, and the induced impacts. In studying the basics of economic theory and how it is found to function in similar situations as that of the IIT, we can gain insight as to what impacts may be experienced by the communities and whether or not the IIT Mandi is a feasible model of economic development in this region.

Expenditure impact is the sum of currency flow within a single economy derived from various sources (students, faculty, visitors, student activities, and university spending). Expenditure impact is typically the first noticeable impact, it grows with the university and after time plateaus (MacFarland, 1999). Two factors that generally aid in the increase of expenditure impact are alumni and the generation of jobs. Alumni donate money to the university, which the university then spends and therefore increases its expenditure (Ohme, 2003).

As more money enters the local economy, local consumer behavior may be affected. If the volume of products sold increases, it could result in an increase in employment opportunities. An increase in the number of jobs will lead to greater disposable incomes.

With more money, people add to the development of consumerism, which in turn creates new markets and increases job creation opportunities. However, any noticeable change in this sector will take time. The system that existed before the introduction of a university, comparable to the IIT Mandi, will still exist even after the introduction of the university. The demand that the population increase creates will take some time to take affect within the local community. The chart, in figure 5 below, demonstrates a model of the expenditure impact.

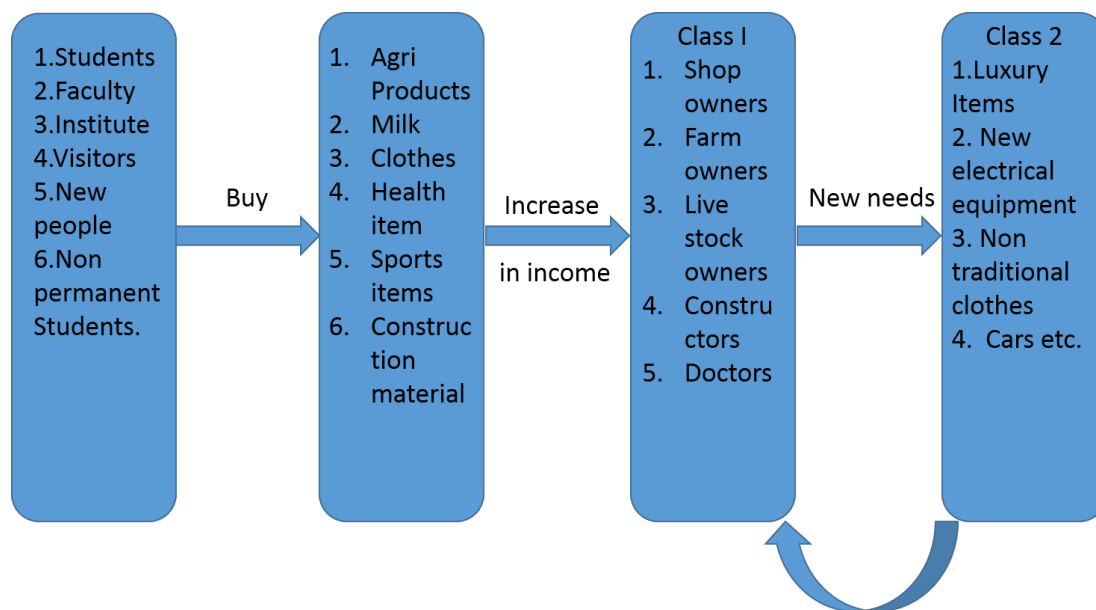


FIGURE 5: EXPENDITURE IMPACT DIAGRAM (KANV GARG, 2013)

Brownrigg developed a case study that clearly illustrates expenditure impact. Brownrigg's model is particularly valid in the scope of this project as he takes into account the demographic aspects of spending. According to this source, the level of impact not only depends on the amount of expenditure, but also the sector of the economy where the expenditure took place. This way, the initial expenditure of the university economy actually demonstrates the further growth of the economy. This model is relevant in the study of the IIT Mandi because Kamand is a predominantly agrarian economy. Therefore, the agrarian sector of the economy would notice a relatively immediate change in expenditure, as well

as an increase in capital present in that sector of the economy. This is termed sectoral impact and it is the idea that an increase in expenditure will affect every sector of the economy separately. Consequently, one can study the economy by sector instead of broadly. However, different sectors have different earning potentials and periods of return (Brownrigg, 1973). Thus, researchers must evaluate all sectors to develop a clear insight into economic impact.

The human development impact (HDI) is the impact that affects the economy in a way that increases as time passes and is usually observed in the long term (Tavoletti, 2007). Two common indicators of the HDI include the increase in knowledge and literacy of the local community and the opening of new industry to accommodate the large number of students on campus. With literacy comes the awareness of rights and facilitates better interaction with the government, which leads to more efficient government function, and the availability of developmental and technological advancement. This advancement would facilitate better management within the industries and would therefore increase worker productivity and increase output, thus supplying the demand for goods. As income potential increases, a more balanced society would result (Florax, 1992). Typically, research universities have a larger HDI because research often opens new industry. With the introduction of new industry, employment increases, introducing capital flow to the economy (Stokes, 1998).

Consideration of the induced impact of the campus is also necessary. For the purposes of this paper, we will define induced impact as all economic effects that are a direct result of the university (Parsons and Griffiths, 2003). Induced impacts can come in many forms. Some of which include an increase in local land values, local or smaller colleges receiving benefits from the university, non-local students introducing additional custom, an increase in tourism, exam preparation centers opening near campus, and university festivals bringing in new currency (Higginbotham, 2007).

The expenditure of a university is the result of many factors. These factors include the drivers that benefit university progress, the linkage mechanisms that exhibit collaboration of the university with outside sources, and support systems that help the

functioning of the university. These factors all create a sustainable system where the university has the opportunity to grow and flourish. The outcomes of this system create new connections that have the potential to turn around and become sources of future expenditure (Huggins and Cooke, 1997).

The Caffery Isaacs model, developed for the American Council for Education in 1971, quantifies trends for analysis. Primarily based on the income expenditure method, it is the most extensively used model (Ohme, 2003). In this model, expenditure from the institute, students, faculty, and visitors, amongst other sources, are calculated. Then, the multiplier, calculated from the ratio of the increased income to the increased spending, is determined and applied to the total expenditure (Stokes, 1998). Once this value is found, a separate multiplier is utilized for the calculation of job creation. Competitive effects of businesses and the opportunity cost, which is the amount that must be paid in order to obtain some economic benefit, of the land are subtracted, and the increase in the value of local land is then added. Thus, judgment of the overall impact is possible (Caffery & Isaacs, 1971).

This study is a good economic model as it tries to incorporate nearly all the factors that can impact the expenditure from the institute and its community. A drawback in this study is that it requires information from departments of the institute as well as the Indian government. Extensive surveys are required to get the final image of expenditures. For developed countries these data may be available readily but in developing and underdeveloped countries, this lack of this data often creates a problem in applying this model for the calculation of economic impact.

Through quantitative analysis, researchers can numerically quantify the change in the economy by determining the new currency introduced into the economy. A broader view of the situation is necessary to use a qualitative analysis. This kind of assessment can describe the bigger picture, and how that might affect the lives of the people of Kamand. By looking both qualitatively and quantitatively at the indicators of economic vulnerability, one grasps a more thorough understanding of how the university is going to impact the community.

2.3.3 ENVIRONMENTAL IMPACT

Finally, it is important to understand some of the environmental impact of the IIT on its immediate surroundings and to establish a baseline for environmental health in the region. Care Earth Trust carried out a sustainability study in 2010, addressing the site as it was by investigating the biodiversity, topography, and other characteristics of the site (*Eco Report*, 2010). In this section, we focused primarily on the impacts of development on the natural world, water and air quality, land use, noise, and biodiversity (Anjaneyulu et al., 2007).

When assessing the environmental impact of any project, there are indicators to look for in order to determine environmental health. These indicators can be broken into two dimensions, as defined by the Organization for Economic Development and Co-Operation (OECD): pollution issues and natural resources and assets (OECD, 2008). In recording perceptions of impact, we expected to hear responses that note air quality, water quality, and waste management as indications of environmental impacts related to pollution. Comments on changes in use of water, forest products, and energy resources, as well as local measurements of local biodiversity might reflect in indicators of environmental health related to natural resource. However, a basic understanding of commonly cited indicators from scholarly work on environmental impact assessment helped us to categorize environmental impacts of the IIT on the Kamand area (OECD, 2008).

Some environmental concerns seem clearly poised for evaluation. Baseline evaluations now will allow for comparative impact data in future years. While we assess perceptions of impact in the project, we can also document physical conditions that appear to signify a threat. One indicator of environmental impact that is particularly pertinent to our study is water pollution. The IIT campus sits on a Nallah (stream), which feeds into the Uhl River, which then flows into the Beas. It is important that people throughout the watershed maintain high water quality. Waste sources that contaminate watersheds typically include untreated sewage, chemical waste from laboratories, construction debris, silt, and household waste.

The campus will reportedly utilize oxidation ponds to treat organic waste. During the monsoon, drainage of these ponds into the Nallah will be permissible (*Eco Report*, 2010). During the remainder of the year, the IIT must consider alternative methods of waste treatment and storage because the Nallah does not have sufficient flow most of the year. However, the construction plans show the oxidation ponds taking four to five years to complete. Beyond water pollution, additional water consumption will be a concern as the campus develops. The procurement of clean water for the water needs of the residents of the campus may have environmental impacts. The IIT will quench its water needs by pumping and purifying on site, therefore altering the water usage patterns for the area. It is unclear what strain this will impose on the aquifer. Consequently, the availability of water, and the ability to dispose of wastewater safely will impact the capacity of the campus and the needs of the surrounding communities (*Eco Report*, 2010).



FIGURE 6: THE NALLAH MEETING THE UHL RIVER BELOW SOUTH CAMPUS. PHOTO CREDIT: FIONA OGREN

Another indicator pertaining to pollution is air quality. Increased traffic to the area will inevitably bring with it increasing air pollution from vehicles. Several factors already contribute to the accumulation of air pollution in the Mandi region. Firstly, most communities in the region are located in valleys, which can be both a boon and a curse in terms of air quality. In certain cases, such as that of the San Joaquin Valley in California, USA, the thermal inversion effect that is common in valleys keeps air from circulating and clearing pollutants (2003 PM10 Plan, 2003). Geography can also be an ally in clearing

pollutants from the region. Valleys can be cleared of air pollutants through a process called hill-valley circulation, wherein winds move up and down the length of the valley, carrying pollutants out with them as they exit (Utasi et al., 2012).

In addition to air quality issues due to increased traffic brought about by the university, the construction of roads could pose an equally challenging ecological issue. Road construction effects environment in several way. Indicators of this impact primarily fall under the natural resource and asset category, particularly as relates to land use and wildlife ecology. As with most construction projects, road development alters water run off patterns, and degrades habitats (Anjaneyulu et al., 2007). When roads are constructed, they not only divide the habitats of local wildlife but they also contribute significantly to noise. Many species will flee from areas where noise levels due to human activity increase. This will typically drive them into more remote locations, which can impact the ecosystem and habitat interactions among species. Furthermore, road construction, and use, may have dramatic effects on wildlife populations, ranging from accidental death to behavioral modification (Trombulak, Frissell, 2000).

The act of building the campus itself will impact the local ecosystem, regardless of any impacts associated with occupation. Through the addition of hardscapes in particular, the built environment of the campus will affect water runoff and absorption patterns, the fertility of the soil, and erosion patterns. The addition of buildings and roads to the area can also impact the local watershed (Anjaneyulu et al., 2007). These additional impacts are much less likely to be mitigated because they result simply from the campus existing.

2.4 SUMMARY

The issues that will affect the success of the new IIT campus in the Kamand region are complex and interconnected. We learned that development of this kind will have impacts across all levels of geographic and social sectors. We delineated the common indicators of consequence on a theoretical level. We collected the best research on the effect that the IIT will have in Kamand on site, due to the nature of allowing locally determined indicators to emerge. In the next chapter, we will outline the techniques we used to record the perception of impacts of the IIT Mandi campus from within these surrounding communities.

CHAPTER 3: METHODOLOGY

The goal of our project was to understand the potential changes and consequences for the Kamand region due to the construction of the new IIT Mandi campus in Kamand.

Our objectives were:

- To record local perceptions of socio-cultural, economic, and environmental change from individuals that reside and work in the Kamand region.
- To document a few of the indicators of change, threats, and benefits to the society, economy, and environment in the Kamand region.
- Create a tool to help visualize impacts and make policy recommendations for the IIT that will amplify the positive impacts and mitigate any negative impacts that the IIT has on the community and environment in the Kamand region.

3.1 RECORD LOCAL PERCEPTIONS

Our first objective was to record local perceptions of environmental, cultural, and economic change from individuals that reside and work in the Kamand region. We first conducted a rapid site and vulnerability assessment in three villages in the Kamand region. The main purpose of this assessment was to gather baseline observations and to orient the team. We drew a basic map of the region to identify the physical relationship of the various villages to the existing campus as well as to the proposed development in the Kamand area.

We determined which villages appear to have the greatest or least risk of vulnerability based on proximity and dependence upon the land. With the help of a local resident we identified key stakeholders in high impact areas. We identified stakeholders from local connections known to our sponsor and IIT partners.

Due to the diversity of the stakeholders we separated them into three groups, each group warranting a different approach. The three groups were IIT faculty and administration, IIT students, and local villagers. We interviewed faculty members who could provide insight into the developing IIT in a sample of convenience. In order to achieve a broader view of the issues at hand, we created a survey that we presented to IIT-

Mandi students, pertaining to their habits, perceptions of change, and the development of the IIT. We also conducted interviews with the students to gather more in depth responses. We conducted ethnographic interviews with village residents. We conducted preliminary interviews with villagers, asking a few broad questions in order to gain entry for more in depth questioning at a later date.

The strategy most practical for obtaining detailed information in this setting was to use a semi-structured, open-ended, ethnographic interview format. We used a set of pre-scripted questions, but they allowed for flexibility. The order of questions was variable and we adjusted the language to obtain desired information (Berg, 2009).

To encourage relaxed and informal engagement, the team collected informal ethnographic data. Ethnographic data provided a description of the culture and understanding of a way of life from the point of view of the residents via their stories. It was beneficial for our research to gather ethnographies because they gave more insight to change over time and which impacts will most directly affect way of life in the local community (Berg, 2009). We designed the interview questions with the intent of gathering as many viewpoints of the same issues as feasible. The questions ranged from broad, introductory questions in early interviews to more pointed questions in follow-up interviews, see Appendix A for full list of questions.

The intent of these interviews was to assess perceptions of the impacts of the IIT on the Kamand region. Remembering, as Berg notes, that “it is important for the action research investigator to recognize that the issues to be studied are considered important by the stakeholder and are not simply of interest to the researchers” (Berg, 2009, p. 253). We took the findings from the interviews and ethnographies and used that data to supplement and further support our findings of indicators of impact. We designed these interviews to reveal the changes that residents of the region predict, and help the team evaluate if the impacts will benefit or harm their way of life in the longer term. Furthermore, they measured levels of local expectation.

Documentation of these local expectations helped our team to target areas of concern that would garner further study. In particular, measuring local expectations

regarding how the campus would affect them allowed us to formulate recommendations to the IIT pertaining to their interactions with local communities. As such, recording local expectations and perceptions allowed us to complete our second and third objective.

3.2 DOCUMENT SOME OF THE PERCEIVED INDICATORS OF CHANGE, THREATS, AND BENEFITS

Our second goal was to document a few of the indicators of change, threats, and benefits of the IIT on the Kamand region. We photographed and otherwise recorded the impacts indicated by the community, and also took records of other factors we observed. As part of the environmental assessment, for example, we estimated the amount of plastic waste generated by residents of IIT Mandi. To do this, we collected data from the provisions store shopkeeper regarding the amount of packaged items that students bought and accompanied this data with data collected from the student survey. Together these two sets provided enough data to give a rough estimate of total plastic waste generated by the student population.

To better present our findings we decided to document our perceived changes with visual aids. These visuals include a collection of villager maps and an infographic. On our second round of interviews with the same villagers we asked them to draw a map of the area. This map could be of the whole valley or just their immediate surroundings. The purpose was really to see the indicators as the villagers visualized them, as opposed to on a conventional map that is defined by roads and political boundaries (see Appendix B). The infographic allowed us to display our qualitative data in a much more accessible way.

3.3 DEVELOP AND PRESENT RECOMMENDATIONS

Our final objective was to make policy recommendations accompanied by our refined map, which together could serve as a planning tool for the IIT and surrounding communities. We designed the tool to show the distribution of impacts, highlight trends in our data, and visually display our findings. We did this in order to both facilitate the IIT Mandi mission surrounding sustainability and community development and in order to

alert the IIT Mandi to unforeseen impacts and factors that may impede the successful integration of the campus into the community and region.

To make the data we collected accessible to the IIT and to WPI, we constructed a map of the area, charting perceived impacts as reported by interviewees. This map depicts the Kamand region and identifies areas currently impacted by the new campus. It highlights the areas that are experiencing the most changes as areas to monitor, particularly if they are experiencing negative impacts. The map is included in the infographic that we presented to the IIT Mandi (see Appendix C).

CHAPTER 4: FINDINGS AND ANALYSIS

Here we will present and analyze some of the key findings from our fieldwork. We organized our findings into three major themes of impact: socio-cultural, economic, and environmental. However, to analyze our findings properly, we organized the analysis by certain key ideas, as our three themes are interconnected and we cannot segregate them.

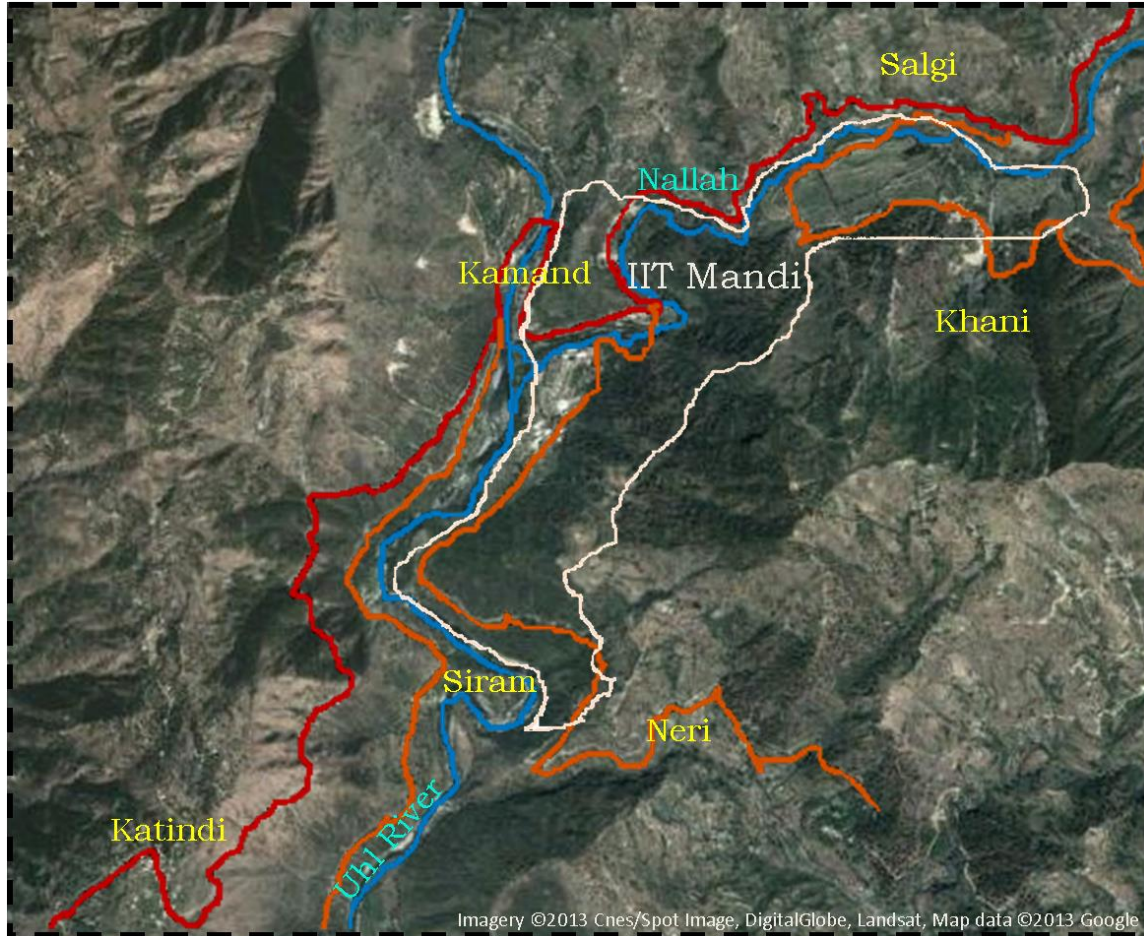


FIGURE 7: MAP OF THE KAMAND REGION

4.1 FINDINGS

The fieldwork that this team conducted gathered information on the impact the IIT Mandi is having on the rural Kamand region. To present this information we will split the findings into three categories: socio-cultural, economic, and environmental.

4.1.1 SOCIO-CULTURAL

One way to identify social and cultural impacts is to ask specific questions about their daily life and values. A second and more subtle technique is to observe how respondents react to every question and how they react to interviewers' presence. Our findings drew upon both of these techniques. Upon talking to villagers, their most prominent concerns were for their children, especially their education. However, our observations also indicated that they were very excited that a new modern infrastructure was entering the area and that we valued their opinions.

When we interviewed villagers from four villages in the valley that had interacted with different parts of campus one unanimous concern came up, the children. Villagers believed that either the walk to the Kamand government school was either too far/unsafe or that the local school was not adequate and it was not worth sending their children there anyway (Kamand 1,2,3, Sept. 11, 2013 and Salgi 1,2,3, Sept. 13, 2013 and Siram 1, Sept. 18, 2013).¹ Distance did seem to be a valid concern. We asked people as far as 4km away and they said their children walked. Upon travelling around the region, it was clear that children walked even further distances. Quality of the school did sound questionable as well. Participants told us that teachers often do not show up for class and the school itself is too small (Siram 1, Sept. 18, 2013).

Though the villagers had an overwhelming negative view of the quality of the government school, we did

Story from Kamand Village

An old man said that he faced many hardships while he was studying in school. In those times, the people were so poor that they were only able to pay the government school fee but they had no money to purchase books and other related items for their children. The old man somehow completed his education up to 10th grade by buying books from his seniors. After sometime, two students from his neighborhood faced the same problem of not having enough money to purchase books. The old man helped by giving them his books and also by purchasing new books for them and with his help, both the children were able to get a degree. Now, one of them found employment as an engineer and another is doing a government job. The old man feels very proud of this.

¹ All of the interviews conducted will be referred to by the village name and the number of the interview in each respective village. Interviewee names will not be disclosed to preserve privacy.

go into the Kamand government school and do some investigating to get the other side of the story. We had an interview with the principal of the school, who is a government worker, and we talked to a classroom of 9th through 12th graders. The principal provided contradictory answers to herself, originally saying that the school had plenty of teachers but later revealing that after 8th grade there was very little STEM (Science, Technology, Engineering, and Mathematics) education because there were no teachers for it. One potentially important point that the principal brought up was that the students did not do their homework because they did not want to and their parents would rather make them work in the fields than do their homework.

We found, that contrary to the census data, there is actually a very low literacy rate in the region, especially for women. Illiteracy of the parents may lead them not to hold schoolwork in high esteem, therefore the children do not do their work, and the cycle of illiteracy continues (Government school 1, Sept. 19, 2013). Unfortunately, when we asked the class of children if they did their homework there was an overwhelming positive response (Government school 2, Sept. 19, 2013). Truly understanding the education dynamic in the valley would require more in depth research that is out of the scope of this project.

One shop owner in Kamand believes that the IIT will help end this cycle. They believe that the IIT will bring more value to education, which families will respond to by valuing their daughters' education more highly. A teacher we talked to in Salgi (Salgi 6, Sept. 23, 2013) also echoed the idea that the IIT will inspire students. Since education starts with the mother, a more educated woman will be able to start teaching her children earlier and imbue with an appreciation for education. This cycle would work against the cycle of illiteracy (Kamand 8, Sept. 23, 2013).

The coming years will not only see the development of the new IIT campus, but of the roads in the region as well. Projected plans involve road widening and paving, as well as a new bridge south of campus. One man we interviewed in Siram informed us of a bridge, which is to be constructed from his village's road to Kahra Road, which runs through the IIT, to create a second route for access (Siram 2, Sept. 18, 2013). However, the

timeline for these projects are unknown, as expected dates of completion continue to change, as a budget for the project only recently passed. Concerns about traffic and ease of transport to and from Mandi town emerged frequently in our interviews with locals. One family we met on the road in Siram, who kindly stopped their motorcycle to talk to us, told us that they had previously used the road to Mandi, but due to poor conditions, they no longer do so. Furthermore, they mentioned that due to a lack of passenger traffic the government has reduced transport services such as regional busses (Siram, Sept. 18, 2013). The construction, due to improve this road and make it the primary thoroughfare between Mandi and Kamand, has not been started so the village of Siram is the only village we talked to that had yet to experience an increase in traffic.

Any children travelling along Major District Road (MDR) 23 from the South and West must now deal with much greater traffic from the IIT buses that run both ways every hour. One shopkeeper in particular was concerned about the traffic threat to the children (Kamand 1, Sept. 11, 2013). MDR 23 now has sixteen extra-large vehicles on the road every day, two every hour, one going each direction. Other than this periodic traffic, construction materials travel over this road, as it is the main way to get from Mandi to the Kamand Campus. Upon asking villagers in the

Story from Salgi Village

A woman and her husband used to live in Mandi town and her husband was in the transport business. For few years, she worked as a schoolteacher in a private school and her salary was 500-1000 rupees per month. So they faced some financial difficulties. Then, her father-in-law asked them to come live in the Salgi village and offered them 0.5 acres of agricultural land. So they decided to move to Salgi. For the initial 2-3 years she faced many difficulties as she was not used to working in agricultural fields. But, with time she was able to develop hard-working skills required for agricultural work and she was able to expand her field to 1 acre. Now she grows a variety of crops such as mangoes, guavas, tomatoes, carrots, wheat, maize etc. The fruits are grown organically but she uses pesticides for vegetables. She finds immense pleasure in distributing her vegetables and fruits for free to her neighbors. She believes that she owes her success to God and the decision to move to Salgi village was very fruitful. Additionally, she has a Master's degree in Hindi and teaches in a government school, situated on the nearby hill in Khani village. She also cooks the mid-day meal for the students and carries 4-5 kilograms of required ingredients as well as fruits and vegetables to distribute to the schoolchildren.

Kamand village, which MDR 23 runs through, about this increase they said they did notice and that the government had told them that the road would be widened (Kamand 2, Sept. 11, 2013). Salgi village, on the other hand, is located near North campus and has yet to notice any significant traffic increase (Salgi 1, Sept. 13, 2013). Lastly, Siram, which is not on the main road, reported that it had not seen any students around and had experienced no increase in traffic.

In terms of culture, people were much less vocal about concerns or any changes thus far. To determine whether the construction of campus would hinder or obstruct access to religious or festival sites, we asked local villagers to tell us if any of these sites exist. A Kamand shopkeeper told us that there was actually a festival held where South campus now is but he does not expect the IIT to interfere (Kamand 1, Sept. 11, 2013). We collected similar answers in Salgi. A shopkeeper said that there was a two-day festival every year held where North campus will be, but he did not seem to believe that construction would affect it. Furthermore, he was not concerned about whether or not it occurred. It was unclear if he thought the villagers would hold the festival somewhere else or if he did not care if they held it at all (Salgi 1, Sept. 13, 2013).

Other than villagers, we also collected perceptions of students and faculty. To gauge student and faculty knowledge of the local culture we asked about their interactions with and knowledge of local villages. Of the students we interviewed, a majority had been into the villages but did not know all that much about the culture. We interviewed only faculty seated in Mandi so they had not really interacted with villagers in Kamand, although one was a local, actually spoke the local dialect, and had interacted with the people on numerous occasions (Ramna Thakur, Sept. 17, 2013). Since we were interviewing educated university professors, we asked what kind of impacts they thought the university would have on the Kamand people. Most responses had to do with modernization and more connection with the outside world, which is what our initial thoughts were when we first started looking into the project. In addition, we discovered that the students and faculty truly were from all parts of India, so the cultural diversity is large.

4.1.2 ECONOMIC

Each of our stakeholder groups had their own ideas and perceptions of how the IIT could influence the economy. In order to gather these ideas and perceptions, we interviewed faculty and administration, students of the IIT, and villagers of the Kamand region. The villagers were able to give us insight into what the valley had been like before the IIT and therefore their views are very specific to what they have seen in the valley before. Whereas the people we interviewed at the IIT tended to draw parallels to other situations they had seen or knew about.

From our interviews, we learned about the history of economic development in the Kamand region. Before the introduction of the IIT, government run Animal Husbandry Department (AHD) owned the land. The AHD, which opened in 1959, and gave benefits to the local people in addition to employment. Benefits from the AHD included health care for both people and animals, and many people from the surrounding villages tended livestock and sold fodder (Kamand 4, Sept. 9, 2013, Kamand 5, Sept. 23, 2013, and Neri 1, Sept 25, 2013). However, only a select few of these villagers worked at the AHD on a permanent basis. The villagers who had permanent jobs with the AHD, migrated to continue working when the AHD left the valley. The Indian government deemed the AHD unsuccessful, as it did not complete its mission to bring new agricultural technologies to the region. Those who were under a short-term contract, had to find employment elsewhere. Without job security, these new employers make the villagers nervous about the future (Kamand 2, Sept. 11, 2013).

Some villagers who the AHD had purchased land from, had a slightly different experience with the AHD. The villagers who received monetary compensation for the land were illiterate, and therefore felt sorely exploited when the compensation was inadequate. The AHD employed some of the people from Salgi; however, those jobs left when the department closed. Now with the compensation money long gone and little to no support from the state government, most of the villagers work as laborers, on farms (Salgi 1, 2, Sept.13, 2013).

The Groundbreaking Ceremony

The IIT hires some of the local villagers as construction workers and security personnel (Siram 1, 2, 3, Sept.19, 2013 & Salgi 2, Sept.13, 2013). During the first construction phase of the campus, the IIT employed approximately 150-200 people from the local villages per day (Katindi 2, Sept 30, 2013). Even though the IIT employs people as construction workers, they received employment through the old contractor. There is a new contractor in charge of construction, and have yet to hire new workers and the locals fear that they may not get hired (Katindi 1, Sept. 30, 2013). The issue the people are having with jobs like these is that they are not consistent. The contracts for construction and even security only assure work for a few months at a time, which makes it hard for the villagers to make a living all throughout the year (Katindi 1, Sept 30, 2013 & Kamand 4, Sept. 21, 2013).

The groundbreaking ceremony for the North campus of the IIT Mandi occurred on October 8, 2013. Many distinguished people from the region and the IIT community were in attendance. This ceremony marked the start of the second phase of construction for the IIT Mandi campus, and also marked the first time that the people of the surrounding communities were actually experiencing any kind of change in their immediate vicinity. During the ceremony people from the surrounding villages joined peaceful demonstrations to vocalize to the IIT that the people of this region want jobs at the IIT.

These peaceful demonstrations were the villager's way to show the IIT that they are willing and able to work. It was interesting to have witnessed this as researchers of this particular topic because it showed that the words and actions of the population of this region are consistent. It is one thing for people to vocalize their want or need for employment, but it is the action of going out and actively asking for employment that really displays their desire for work.

The villagers perceive that the number of people from outside the valley receiving jobs is higher than the number of local residents. The residents of all the villages we visited want the IIT to offer them job preference. In particular, persons in the village of Salgi want the IIT to consider outsiders for employment only in the case that local villagers are not qualified for the job. Following the completion of their secondary (grade 10) or senior secondary (grade 12) education, the students from Salgi village, often go to Industrial Training Institutes (ITI) to learn basic industrial skills. These educated villagers are

available for work in trades such as plumbing, carpentry, and electrical work (Salgi 2, 4, Sept.13, 2013).

Even though people within the villages have skills, they often feel that they miss opportunities at the IIT because of a lack of advertisement within the Kamand region. By the time that the residents hear of job openings, the IIT has already filled the positions. The head of the Salgi village claims to have traveled to South campus to appeal to the Director for employment for his people, 5% of whom reportedly live below the poverty line, but claims the guards turned him away. The people feel ignored by the university and want to meet with a higher authority so the Kamand Valley Development Society, the local union, can plead their case (Salgi 4, Sept.13, 2013).

The laws governing the buying and selling of land vary from village to village. In Salgi, villagers may buy and sell land, but outsiders can only sell specific plots sanctioned by the government (Salgi 6, Sept. 24, 2013). People in this particular village are projecting that businesspersons from around India will be trying to buy land in the area to open shops for the North campus. They are reluctant to do so, because they believe that local businesses will suffer. Furthermore, if they keep their land instead of selling it to outsiders, their children will have job security. In case they cannot get a job on their own, they can always fall back on the land. "Money may come and go, but land is forever" (Salgi 8, Sept. 24, 2013). In Katindi, the only people allowed to buy land are those who hold agricultural certificates. The reason behind this is that in 1975 outsiders were coming into the region and buying all the land from the poor villagers. The government found out about this, and restricted the land. However, outsiders may rent land in the area (Katindi 1, Sept. 30, 2013). Similarly, in Kamand village, outsiders can rent land in the area. The difference is, the Kamand people also cannot buy more land (Kamand 5, Sept. 23, 2013). The differences in land purchasing policy are interesting because of the close proximity of these areas to the IIT. The question remains if businesses will be able to open in this area to meet the needs of the expanding IIT in the future.

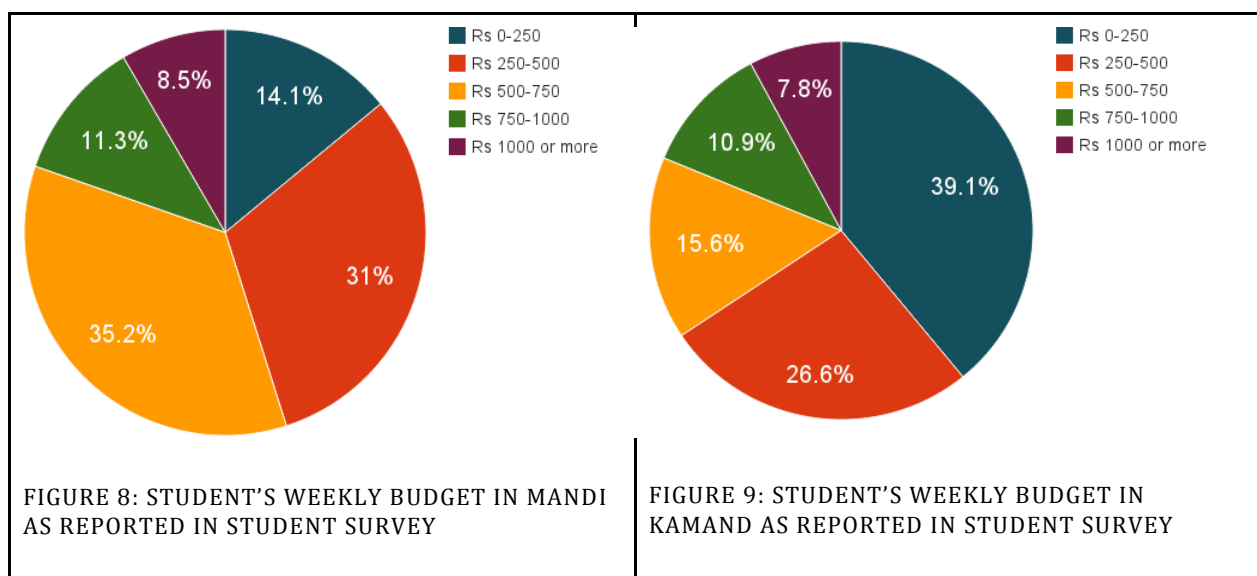
The village that has seen the most immediate positive impact so far on their businesses is Kamand. We expected this, as it is the closest to campus and the main road that leads to campus passes directly through the village. In this village, the shops have experienced an increase in business coming from students, faculty, and construction workers who eat at the shops and buy essentials (Kamand 1, 3, Sept. 11, 2013).

With the IIT and all of its students, faculty, and staff moving into the area in the next few years, the challenge of feeding them presents itself. A majority of the local population relies on agricultural activities to make a living, so there is hope that the IIT will be a new market for local crops. Residents involved in agriculture typically responded positively when asked if they would like to see a farmers market established within the new campus (Salgi 2, Sept.13, 2013 & Siram 3, Sept.18, 2013). Villagers of Siram said that if the IIT were to offer to buy their crops, they would step up production and plant more (Siram 1, 2, Sept.18, 2013).

The IIT faculty and administration are currently still split between Mandi and Kamand, with half of the campus located in a building originally belonging to the Vallabh Degree College, and the other half of the campus moved to the developing Kamand South campus. Most of the faculty currently live in Mandi and commute to Kamand, an average of three days a week, to teach classes on the Kamand campus. When asked about moving into the faculty housing in Kamand, Professor Soni of the Physics department said, “Resources come with people, and people go with resources. It is a two way street. Nothing is sudden, everything is gradual” (Ajay Soni, Sept. 17, 2013). This attitude leads us to believe that the faculty will be more willing to move to the Kamand campus once basic provisions are available in that area. The problem with this is that the IIT will only provide provisions once there is a demand for them. Currently the staff that occupy housing on the Kamand campus, do the vast majority of their shopping in Mandi town, save a few basic everyday things they can get locally (Bharat Singh Rajpurohit, & Chayan K. Nandi, Sept. 17, 2013). However, the introduction of provisions and other shops to the Kamand region would eliminate the need to make trips to Mandi.

The faculty expressed high economic hopes for the people of Kamand across the board. From the IIT faculty, we learned of the interest the locals have expressed to them about work at the IIT. Faculty members told us of new job opportunities for local residents of Mandi and the Kamand region. Hiring of locals for high-level office jobs, in addition to cleaning people, security personnel, and construction workers is occurring (Bharat Singh Rajpurohit, Sept. 17, 2013). These higher paying jobs will increase household income and therefore the quality of life (Ramna Thakur, Sept.17, 2013). There is great interest in the businesspersons of the district to open shops and other stores in close proximity to the Kamand campus. For example, the owner of Treat in Indira Market has opened a canteen on campus, next to the Director's office, that is quite popular (Bharat Singh Rajpurohit, & Delia Hornfeck, Sept. 17, 2013).

We asked students of the IIT Mandi, most living on the Kamand campus, to complete a short student survey, mostly regarding their economic habits. The purpose of collecting this data was to establish the student expenditure when the students were living at the Mandi campus, and then compare it to the expenditure of the students on the Kamand campus. The comparison, displayed in the following pie charts, of the weekly budgets of students in Mandi (figure 8) and Kamand (figure 9).



As indicated in the above pie charts, the budget that students spent in Mandi, where goods and shopping is more accessible, is substantially higher than the estimated budget in Kamand. The purpose of this information is, first, to compare what the budgets of the student body are like in both Kamand and Mandi, where there are more shops and restaurants. The second purpose is to project that if there were more shops open in Kamand, the student expenditure would be similar to the expenditure spent by the student population in Mandi.

Student input into the economic impact of the IIT also included the knowledge that in most other IIT's, a village seems to pop up within, or just outside the walls of the institute. Some facilities that the student population expressed desire to open in the Kamand region included, but were not limited to: a cafe or coffee shop, a cinema, a shopping mall, good restaurants, chain restaurants (i.e. McDonalds/KFC), a place to play sports, an open air theatre, a swimming pool, or some sort of a park.

4.1.3 ENVIRONMENTAL

To gauge the perceived impact of the campus on the local environment, we collected data primarily from students and local residents. We asked each stakeholder group a few general questions related to waste management, water quality, traffic, and wildlife. In order to provide insight into how each group experiences and contributes to environmental impact this section will look at the experiences of each stakeholder group individually. While we did interview faculty, comments on environmental topics were scarce, since they did not know much about the area. The most useful information on environment came from two chemistry professors, as they could talk about the chemistry lab and the plans on how to deal with the chemical waste.

When interviewing local residents, we asked them to tell us how they dispose of their waste. We received different responses depending on where the individuals lived. Residents in the communities of Kamand and Salgi, upstream from the campus, throw waste directly into the river, because there is nowhere else for it to go. Downstream from the campus however, residents of the community of Siram responded that they did not throw their waste into the river, but instead threw it onto the hill, because they know that

other communities downstream use the water. The consensus among all interviewees was that they regret throwing their waste into the river and they were only doing so because no other option exists. Furthermore, they would like to see a waste management system implemented in the area, possibly by the IIT, and they would use it if it existed.

Parallel with the responses about waste disposal, when asked if they had noticed any increase in waste since construction of the IIT began, answers varied between communities upstream and downstream from the IIT. Upstream, residents responded that they had not noticed any increase in waste. The story was different downstream however. One group of interviewees from Siram noted that they had noticed an increase in sewage and construction waste in the river. Furthermore, one interviewee, who had worked on the construction of the campus, said that much, if not all, of the construction waste and waste from the workers' camp went directly to the river (Siram 1, Sept.18, 2013).

To address water issues that reach beyond pollution, we asked residents of the villages to tell us where they get their water. We did this to gauge vulnerability to possible water scarcity due to additional draw from the IIT on the local water supply as well as the implications of additional water pollution. Most interviewees got their drinking water from government pipes. However, in Kamand and Siram in particular, residents indicated that these pipes did not supply enough water and that they are very unreliable. In Siram, one group of interviewees reflected that when the taps, supplied with water from government pipes, did not work, they must go to the river for water (Siram 1, Sept. 18, 2013). In Salgi, interviewees noted that they typically have plenty of water coming from mountain run-off, except in the dry summer months, and that the government pipes were a very recent addition (Salgi 2, Sept. 13, 2013). Despite the government supply, typically collected at communal pumps, all residents interviewed indicated that they need more clean water, and that they are unable to purify it themselves.

In an interview with a local fisherman, we asked if he had noticed any change in river water quality and fish population. He said that the construction workers are throwing a lot of waste in the river and he also observed an increase in fecal matter in the riverbed and decrease in fish population. Due to the increase in fecal waste it became hard to walk in

the river and hence difficult to catch fish (Jogi Ram, Sept. 21, 2013). This river water pollution is also reported by two forest department workers (Hukm Chand and Sher Singh) working in the nursery located on the banks of river Uhl. Before IIT, they used to get the river water for drinking and watering plants. But now with increase in waste, they have to bring water from a distant place. Also, according to interviewees, some of the workers from the forest department left their job because it is difficult to work in summer due to smell coming from of the fecal matter.

The IIT is having an impact on forestry. Just by the nature of building structures and an increase in noise, not to mention the cutting down of trees or the leveling of plains. The destruction of natural habitats in the area will displace many animal populations. Farmers in Neri village noted that they cannot grow more crops because of the increasing monkey population (Neri 1 & 3, Sept. 25, 2013). In Katindi, around the same time as the IIT came to the area, a strange animal started to come at night and chew down the corn crops (Katindi 2, Sept. 30, 2013). From the description, this group has made the assumption that this mystery animal is the crowned Indian porcupine. As much as the IIT has a plan to avoid cutting down excessive numbers of trees, the act of building the campus is nevertheless displacing wildlife. This displacement can become an

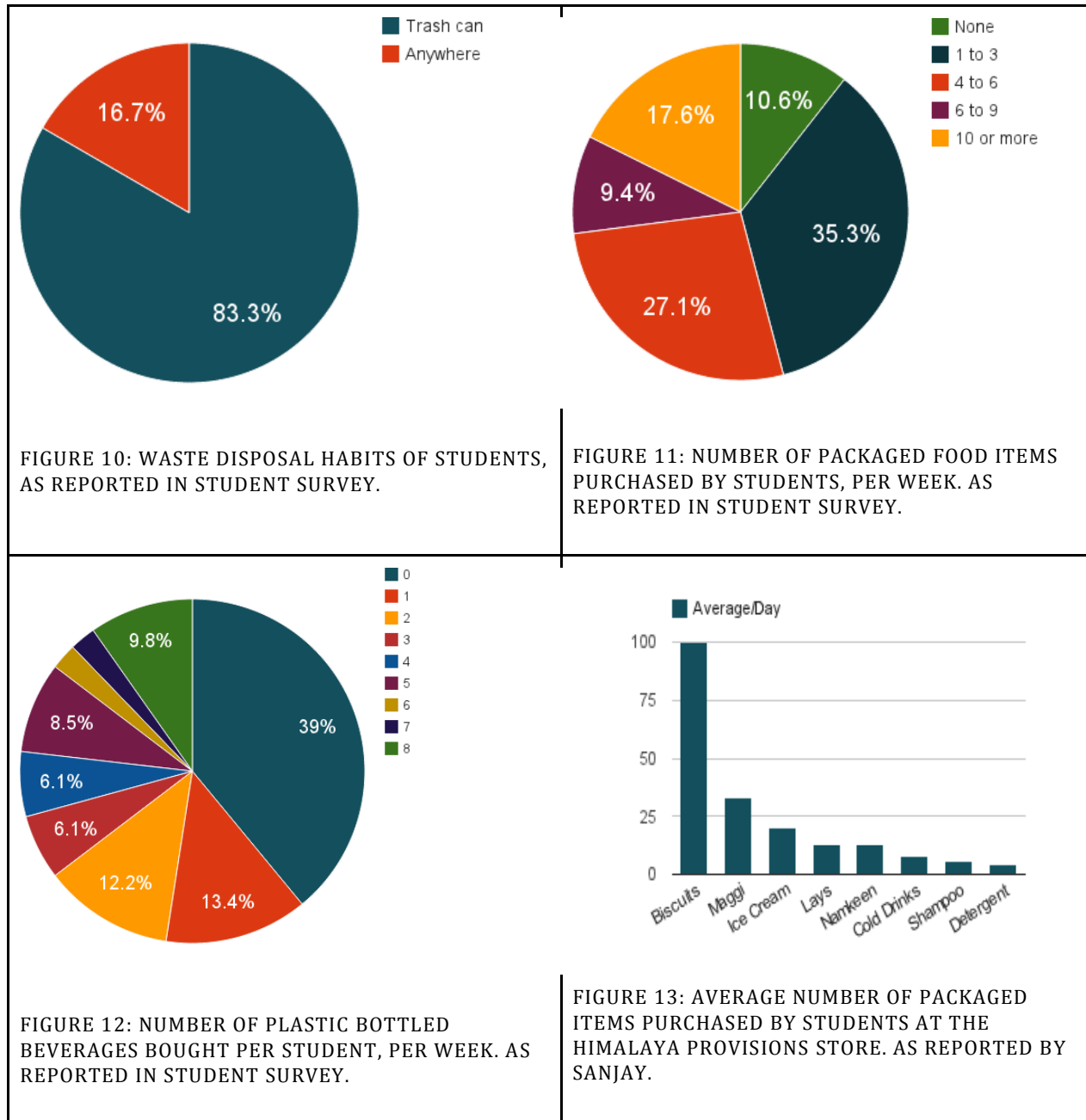
Story from Neri village

We spoke to a woman in Neri who told us about the many problems in her life and how the IIT has the potential to solve them. She has multiple hard-working sons who have completed 7 years of schooling. They received some work from the IIT during the first phase of construction when an earlier contractor was in charge but, the second phase contractor has yet to hire people. She learned that the IIT was employing people from outside the region and was very upset that the IIT would leave her sons unemployed. Their lack of income would ruin her already poor family and not allow her to support her daughter in the Mandi hospital (Neri 3, Sept. 25, 2013).

This woman said that she had more land that she could use to expand her farm and provide her sons with employment, but she claimed to be unable to grow more crops due to the large monkey population. We asked this lady if she would be interested in taking advantage of a farmers market that the IIT might open. She was excited, but said that her family has been unable to expand their farm beyond self-sufficiency because the monkeys would come and ruin or steal their crops. She went on to explain how the monkeys came to attack in groups and had grown more aggressive in the last couple of years.

issue for the people in the surrounding region, as the wildlife no longer able to live on IIT land, might migrate closer to villages and destroy crops among other things. Furthermore, the displacement of wildlife interferes with ecosystem dynamics and could damage wildlife populations.

In our student surveys we asked students to tell us how they dispose of their waste. Due to some technical errors not all students who we surveyed were able to answer this inquiry. From the responses gathered, most students say that they put their waste into the trash bin when one is available. However, some freely admit that they will throw their trash anywhere. Additionally, we asked students what quantities of packaged goods and beverages they bought on a weekly basis and compared this to the reported amount of packaged items available at the Himalaya Provisions store located on the South Campus. Below are four charts illustrating student waste disposal habits and packaged food consumption.



In an interview with a member of the cleaning personnel of the IIT, we asked him about where he throws the waste collected from hostel rooms; he said that currently the institute has only a few large dustbins for collecting all the waste and these are placed at large distances from the hostels. So he dumps all the waste into the small Nallah that is closer to the hostels and believes that during heavy rains there will be enough water flow in the Nallah that all the waste will go into the Uhl River. On the contrary, in an interview

with Chaman Lal, caretaker, Prashar Hostel, the institute currently has 8 large dustbins located at different places throughout the campus (one for student's hostels, one for faculty houses, one for mess, etc.). Once these large dustbins are full, the institute's vehicles dump the waste at a waste disposal site.



FIGURE 14: WASTE DISPOSED IN A DRY CREEK BED NEAR THE STUDENT HOSTELS ON THE KAMAND CAMPUS, SEPTEMBER 2013.

In an interview with Dr. Chayan K. Nandi, a professor of chemistry and biology who has been the sole chemistry faculty member giving input into the design of the new chemistry laboratories at South campus, he discussed the current method of storing chemicals and the planned method. At present, chemical waste is stored in separate jars, as the campus develops, it the IIT will use a different system. The current plan is to build an underground storage system that would hold different types of chemicals separately, however this will take several years to be constructed. However, the IIT will not empty the chemical waste into the environment (Chayan K. Nandi, Sept. 17, 2013).

4.1.4 DOCUMENTED IMPACTS

To address our second objective, we documented evidence of what impacts we could see happening in the Kamand area. Below we will present pictures that we took to document indicators as we saw them.



FIGURE 15: POLLUTION BY THE NALLAH



FIGURE 16: TRASH SLIDE ON CAMPUS



FIGURE 17: CONSTRUCTION WORKER
ENCAMPMENT IN S. CAMPUS



FIGURE 18: NALLAH ENTERING INTO THE UHL



FIGURE 19: SOUTH CAMPUS CIRCA 2010



FIGURE 20: SOUTH CAMPUS 2013



FIGURE 21: COW ON MDR 23



FIGURE 22: FODDER BUNDLE FOR WINTER



FIGURE 23: MILK GOD POSTER IN KAMAND VILLAGE



FIGURE 24: PLACE OF DEITY ON NORTH CAMPUS



FIGURE 25: CONSTRUCTION WASTE BURNING ON S. CAMPUS



FIGURE 26: WOMAN CARRYING WATER AWAY FROM A GOVERNMENT WATER TAP



FIGURE 27: WATER PROJECT SIGN.²



FIGURE 28: MORE GOVERNMENT BUSES PASSING THROUGH KAMAND



FIGURE 29: DEMONSTRATORS AT THE GROUND BREAKING CEREMONY



FIGURE 30: TAR NEAR THE FRESHLY PAVED HILL TO THE GUEST HOUSE

² Loosely translated as:
 “Himachal Pradesh Water and Pubic Health Department
 Drinking water project: Seri ____
 Village Panchayat: Kamand ____
 Villages benefitted : 17
 Population Benefitted: 2725
 Estimated Cost : Rs. 28,400,000”

In this section we displayed the findings from our fieldwork done in the Kamand valley. We presented the data in three different categories, and next we will move onto analyze this data.

4.2 ANALYSIS

As we conducted our interviews, an overwhelming sense of optimism seemed to prevail within the communities. Seen as a 'beacon of hope,' many people genuinely believe that the IIT coming into the valley is going to solve most, if not all, of their problems. Instead of focusing on possible negative impacts that the IIT could have on their way of life, they have focused on all of the benefits the IIT could bring to their communities. This pervading optimism surprised our group. We believe it is possible that the villagers have not thought about the total scope of the IIT, as only a small portion is constructed, and this is a reason they see no negative impacts. Many people, especially in Salgi, adjacent to North campus, where construction has yet to start, seem to lack awareness of the scope of the construction. The villagers do not seem to have the image of a massive block of buildings, accompanied by thousands of students, faculty, and staff, surrounding them. Whether this is due to lack of communication between the IIT and the communities or the fact that no construction has begun and nothing has changed yet, is hard to tell.

A theme that appeared as we looked through our findings was the villager categorization of people as either insiders or outsiders of the valley. Those who live in the valley see anything, or anyone, that enters the valley with different social values and culture as an outsider. By this definition, the valley sees the IIT as an outsider. Symbolically, this is obvious by coming to the IIT, as you have to pass through a gate that tells you that you have entered the campus. The IIT would greatly benefit from the people of the valley considering it as an insider as this would promote a sustainable relationship.

Though the valley as a whole sees the IIT as an outsider, it accepts some people within the IIT as insiders more so than others. The locals employed by the IIT are the most accepted, as they are not at all outsiders, followed by: students, professors and administrators, and then laborers from outside the valley. The people of the valley accept the students more than any other outsider from the IIT. Currently, the valley occasionally interacts with the students and it will have more interaction with the NSS programs, and they hope that the students can have a positive effect on their own children. We personally experienced the villagers' acceptance of the students when the women of Siram village

talked to us even after people, who they said were outsiders of the valley, had robbed them. On the other hand, the professors and administrators seem to have been accepted less because they have had less interaction with the community. Villagers of the valley view laborers from outside the valley in a very negative way. The villagers are generally upset with the outside laborers because they were taking employment positions that the locals could have filled. Villagers we talked to also noted the waste that the laborers were producing, and dumping into the river, as a problem.

Story from Siram village

A woman told us that “some people, probably thieves, come during the day time and ask everything about the family and try to be gentle with us. After that they come back at night to rob the house which they visited earlier during the daytime.” So, that’s why she was reluctant and afraid of us initially and she never told us her name. The woman saw that we were students and that is why she agreed to talk to us, she trusted that we were not going to do her any harm.

The IIT should bridge the gap and become an insider if it wishes to establish a strong mutually beneficial relationship within the valley. Our team, by going into the community and talking to the people about their lives, effectively bridged the gap between the insiders and outsiders, and provided an example of the possibility of the IIT working its way to becoming an insider. Since students are currently the most accepted outsiders associated with the IIT, they can help the most to further the villagers’ acceptance of the IIT as an insider. Through the NSS and the IITs 3rd year projects students have the chance to bridge the gap and make the IIT as a whole more of an insider.

The communities of the Kamand valley exhibit several indicators of social and economic vulnerability. As discussed in the literature review, the United Nations Department of Economic and Social Affairs, created a vulnerability index based around shock and exposure (Guillaumont, 2011). The communities of the Kamand valley exhibit several indicators pertaining to exposure. The communities are generally remote, with no more than a few hundred residents at most. They are predominantly agrarian, and with the cost of land in the area increasing dramatically due to the development of the IIT, the latest in a long history of land cession, first to the Animal Husbandry Department, and now to the IIT, they are rapidly losing the land that they rely on for their livelihoods. These factors

have made the communities in Kamand vulnerable; however, their strong cultural and familial bonds help to provide some offset.

Consequently, the prevailing optimism and hope that the IIT will remediate all of their problems is encouraging. As a whole, the people seem to believe that while the IIT will solve all of their problems, all of their traditions and the positive aspects of their way of life will remain mostly unchanged. This demonstrates at least some degree of perceived social and cultural resilience. While they may exhibit several indicators of social, economic, and environmental stress, their determination as a group that they will remain unified by their culture, increases their overall resistance to some changes that the IIT will undoubtedly bring.

As we conducted our research an interesting pattern emerged around demographic regarding the order in which interviewees brought up topics and the topics they thought were worth mentioning at all. The women and men we interviewed always brought up employment first, but generally for different reasons. Women generally focused their concerns around employment for their children, whereas men were more generally concerned about the village people bringing in money. Another noticeable gender difference was that some men said that there were no water concerns in their village, while women in the same village voiced the opposite.

There was also a noticeable difference in perception of change generationally. Much of the older generation expressed few concerns and felt that the IIT would affect their lives very little. The middle generation, those with children still in school, felt that the IIT would have a much larger impact on their lives, and that of their families, affecting socio-cultural, economic, and environmental aspects. The younger generation, seemed to believe that the IIT would impact their lives greatly, by providing them with employment, and modernizing their way of life.

Villagers often brought up the topic of economics. Many of the residents have expressed concerns about unemployment. Furthermore, they have addressed the topic of opportunity, and more specifically the lack of opportunity in the valley. Throughout the

area the overall mood regarding the economic future of the population has been positive, as with most other topics addressed.

Businesses want to open shops in the Kamand region, thus allowing people to buy more things locally, and eliminate trips to Mandi town. With all this outside money coming into the region, the economy will increase. Introduction or expansion of service facilities will supply peoples' increasing demand for goods and activities. The student population, as well as the younger generation of villagers, yearns for things to do in the area, such as going to the cinema, restaurants, parks/playgrounds, and so forth. Such places will create jobs for local people, and allow people to spend more of their money in the local region, thus expanding the economy.

Another key issue that came up frequently in our interviews was the general lack of employment among residents. While much of the population is involved in agriculture and related activities, many produce just enough to sustain their families. In the future, if the IIT was to buy crops from the immediate region, villagers are more than willing to grow more crops in order to fulfill the demand. The increase in crops would then lead to many other factors including environmental concerns such as deforestation, economic growth from the people making an increased income, and social changes, as the farms would need more people or time for the crops.

The most fervently held opinion of the local population seems to be about preference of jobs at the IIT. They strongly think that unless they are unqualified to do the work, no outside person should get a job before an unemployed person of the Kamand region. With some local people going to higher and more specialized education, the entire community agrees that the IIT should look to the local community for employment before going elsewhere.

The geography of this region has stood out to us to be a major indicator of current and perceived impacts of the IIT on this area. We found a trend of the distance of the village from the South campus and how much the villagers think that their lives are going to change. Villages such as Kamand, who are in close proximity to South campus, know that even though the campus is incomplete, the IIT is going to have an impact on their lives.

These villages are also embracing the university in their willingness for the IIT to change their lives and excitement to integrate with the new community that is going to be coming to the area. On the other hand, villages that are secluded from the campus like Siram, are adamant that their ways of life will not change. When talking to one man from this town, he told us that he does not care what happens over on the campus, as long as the IIT leaves him alone and does not try to impose change on him and his family (Siram 2, Sept. 18, 2013).

A very important feature of the region is that it is a valley. We discovered that this geographic feature had a huge effect on many aspects of impact that we noticed and greatly shaped the region into the way it currently is. For example, children tend to stay in their family's traditional jobs, doing the same work, such as farming generation after generation. Especially because there is only one road into and out of the valley, this has secluded it even more from the rest of the outside world beyond Mandi. This seclusion is especially significant because this means that the IIT will be the first significant modern infrastructure in the valley.

The seclusion of the valley has led some people who regularly leave the valley to realize that it is not nearly as modernized as other parts of India, even Mandi city. This lack of modernization has allowed the culture and social values to be very stable, avoiding challenge by outsiders. The lack of change is a cyclic process. Parents who send their children to school in the valley have generally one option, a government school. The government schools are not up to date and students do not seem to have much motivation to complete their education. Beyond the lack of motivation, there are no facilities for STEM learning and thus the majority of students study humanities in their high school years. Many students end up dropping out and working with their parents, doing the same traditional jobs that keep them in the valley. These children then grow up constrained to the valley and the process continues.

The IIT will bring more job options into the region as well as modernizing its infrastructure. New job options may encourage children to explore different career options than those held by their parents, even if they do not complete grade school. The greater

connection of the valley to the outside world may allow them to learn about different ways of life outside of the valley. If the children know of the modernization and progress of the world, they may aspire to become part of it and therefore work harder in school with a newfound purpose that did not exist before. If the actual education system is the problem, it is possible that the schooling and tutoring that the IIT offers will be able to reach more children, more effectively. This could allow children to develop more skills to apply in the valley or to use so that they can leave the valley.

While children leaving the valley to pursue higher education or more competitive jobs may seem to be a good thing, it could have further implications. An exodus of youth from the valley would leave fewer people to continue traditional practices, thus degrading the religious activities, social structure, and community security of the valley. The loss of a large cohesive unit puts the villagers of the valley at a greater risk according to the United Nations Department of Economic and Social Affairs.

The valley topography is also very important to the environmental concerns that we have discovered. Water runs down from the hills that surround the valley and it all goes eventually into the Uhl River, this means the whole valley is beholden to this one water system. Since there is no waste management system in the valley, the social norm is to dump waste into the rivers, either directly or indirectly. This communal water source is therefore no longer safe and clean for the whole valley.

As with any community, clean water was a clear and present issue among those we interviewed in the Kamand valley. The difference in responses to inquiries about water quality, however, was dramatic between communities living upstream from campus and those living downstream. Communities living upstream from campus reported no difference in water quality, while those living downstream reported a noticeable increase in both sewage waste and solid and construction waste. While this distinction is unsurprising, it does highlight the fact that even those communities who may not live within sight of the new campus will experience environmental impacts, especially where water is concerned.

Additionally, water scarcity seemed to be another concern for communities throughout the area. Many complained about the lack of clean water and that the government supply is unreliable. The buildup of infrastructure could either exacerbate or remedy the problem. If the IIT brings water in through pipes, the expansion of that system to nearby communities would undoubtedly be a boon. If the IIT pumps water on site, it could put strain on the aquifer and further the water scarcity problem. Furthermore, with changes to water runoff patterns already apparent on the developing South campus, the health of the watershed could suffer in the coming years.

Unsurprisingly, waste management also seems to be a concern for many in the Kamand region. With no waste management system in place, the villagers admit to throwing all of their waste into the river, or simply on the ground. The nearly unanimous hope that the IIT will implement a waste management system pervades throughout the surrounding communities. As the campus is constructed and the student population increases, the IIT will have to face the task of implementing a system of some variety, particularly because it is evident that no such system yet exists.

The IIT, with its eventual population of over 6000 residents, will be a huge influence because the valley is such a closed system. The IIT has the potential to be a leader in cleaner waste management by implementing a system. It has the potential to alleviate the clean water problem by influencing the government to increase the supply flowing into the region, or by establishing a water purification center in the valley. Furthermore, it has the potential to increase employment by hiring locally for all possible positions. Unfortunately, the IIT is also in the position to degrade the region significantly.

As the IIT grows and develops so too will the infrastructure needed to support it, not just in the Kamand region but also in the state of Himachal Pradesh as a whole. Due to the fact that the IIT Mandi is going to be a world-class research institution, it will attract many academics and companies from across India and the world. These people will need to be able to reach the IIT. With development, this region will become more accessible than ever. Though it is unlikely that the valley will ever become anything more than remote, due to the nature of its geography, it will still experience an increase in connectivity with the

rest of the world. This has the potential to impact the communities living in the Kamand region dramatically by altering their worldviews and providing greater access to the rest of the country, and the world.

The IIT will indirectly connect the people of the valley to the rest of the world as the IIT brings many people from all around the country. But the IIT also introduce more direct connections in order to bring these people to the IIT. There is currently only one feasible road into the Kamand valley, MDR 23, but another road that takes a less direct approach, by avoiding going over the ridge, will soon join this. The journey to Mandi and the Kamand region is also long and not easily accessible but the government plans to make this part of the trip easier as well. The local airport in Kullu has long been inadequate as the runway is too short and is perpendicular to a mountain. However, the government, as a direct result of the IIT, plans to increase the length of the runway, allowing for safer, expanded usage. The government also plans to expand the road from Chandigarh to Mandi. The new road will take a more direct route, cutting the distance from 200km to 117km. The government also plans to widen this road so they can accommodate four lanes of traffic. Finally, for the very elite, the IIT may potentially have helicopter access.

As road infrastructure is improved, several impacts covering social, economic, and environmental aspects are possible. These could include wildlife displacement, causing not only damage to the ecosystem but also to the livelihoods of the local farmers, as displaced animals have proven to be disruptive of crops. The roads themselves will further prove damaging as they will alter water runoff and erosion patterns, possibly resulting in an increased frequency of landslides, and potentially degrading any farms situated below them. During the construction phase, the presence of construction vehicles, workers, and materials such as tar and other waste will increase air and noise pollution and contribute to accumulation of waste in the environment. Furthermore, the construction will likely be disruptive to the communities situated along the roads, and impede their access to Mandi, where many sell their crops, and to essential services, such as schools and medical facilities. Following the completion of the road, communities such as Siram that are located off of the main road now, will have a heavily trafficked road implanted into their midst. This could increase crime rates, contribute to noise pollution, and light pollution from cars

and streetlights may result. Conversely, communities such as Katindi could experience a decrease in traffic once the government builds the new road.

There was only one woman that we encountered who had seen the plans of the IIT. She was a woman who lives directly across the Nallah from the North campus site. She is an educated woman with a master's degree in the Hindi language and a schoolteacher for the children in Salgi. What surprised us so much about this is that the heads of the villages have not even seen any of the plans of the IIT, but a schoolteacher has seen the entire plan. With this knowledge, she is able to assess what changes will come about from the IIT more accurately. Without this knowledge, the greater population of the Kamand region really has no way of fully understanding the scope of the campus, and therefore will not have an accurate perception of impact (Salgi 7, Sept. 25, 2013).

Since we carried out our assessment so early on in the construction of the campus, it was clear that some people had yet to give a lot of thought to the effects the IIT might have on their life. Even though we could not get fully formulated opinions, some reactions are valuable to note. Some villagers we talked to, especially the elder group in Salgi, were elated that we would even bother to listen to them and that we cared about their opinions. They had previously had little contact with the world outside of the valley and so they were suddenly able to tell people who had no knowledge of their situation about their problems and hopes (Salgi 2, Sept. 13, 2013). This open conversation was actually quite a surprise to our group, we were worried the villagers would be reserved and would not openly talk about all aspects of life with us. We met another man in Siram whose actions are very valuable in helping us to understand the valley. He had left the valley and received an education, then proceeded to travel around India and learn many languages and dialects. Nevertheless, he was now back in his home valley cutting fodder and living with his parents who now needed help and could not live on their own (Siram 4, Sept. 18, 2013). This return to the valley by someone who has experienced so many other cultures is very valuable. In other situations, we have seen that once a person receives higher education, they many not value old traditions or want to stay in the valley (Salgi 4, Sept. 13, 2013).

CHAPTER 5: RECOMMENDATIONS AND CONCLUSIONS

As a result of our study and analysis, we have constructed recommendations for the sustainability of the IIT Mandi campus. We will now briefly reflect upon the project and present our conclusions.

5.1 RECOMMENDATIONS

In our recommendations section we will break down the key areas of concern into three categories. Generally, these three areas are *cooperation and communication* between the IIT and the local communities, *internal concerns* of the IIT, and *environmental issues*. We aimed our recommendations at fostering a sustainable relationship between the IIT and the local communities. Our three overarching recommendations for the IIT are as follows.

- Cooperate and communicate with the communities already in existence in the Kamand valley to develop a mutually beneficial relationship.
- Strive to develop awareness of regional culture and environmental awareness, through educational programs and policies within the university.
- Continue to implement socially, economically, and environmentally sustainable practices that extend beyond the university.

5.1.1 COOPERATION AND COMMUNICATION

The most important recommendation that we can make is that the IIT and the local communities establish consistent communication. In order to facilitate this communication, we recommend that the IIT schedule meetings with the local communities to provide a platform for them to voice their concerns. We suggest that these meetings take the following form:

- Town hall meetings to voice concerns open to community members, with the Director, upper-level administrators, and all members of the committee in attendance. These would occur every four months, approximately once a semester.

- A meeting every two months, of a committee made up of faculty from various disciplines, administrators, and village heads, to implement solutions to problems and evaluate the progress of any implementation.

The reason that we determined that both of these platforms are necessary, is in order to eliminate the problem of the intermediary. This is essential because the IIT must be aware of all of the concerns, not just those deemed important by an intermediary. The decisions then fall to the committee, representing the IIT and village heads, as to how to address the concerns most effectively. This way the information received by the IIT is as unbiased as possible. Another reason why the town hall format is important is that often the best way to address minor concerns is simply to listen to them. Therefore, in order to make people feel that the IIT has heard their concerns, it is important that the Director attend these meetings, as he is the most recognizable person from the institute. The local attendees at these town hall meetings could range from a selection of individuals from every village to every villager attending to present their concerns and input. We will leave the final decision of how to organize these meetings to the IIT.

Aside from town hall meetings, we recommend that a committee, composed of faculty from various disciplines, administrators, and village heads, meet more frequently for two purposes. First, it will be easier to decide how to address these problems, prioritize issues, and facilitate solutions. Second, it will make it easier to keep track of the progress of solutions that may result. Some of the topics that the committee could address range from present concerns to the establishment of cooperative endeavors. Below we listed a few of the topics that we would like to suggest that the committee addresses.

- Conduct outreach to the local communities during the construction phase to ensure that all members of the community are aware of the development plan. This also addresses possible concerns that may arise from the IIT, such as safety and traffic issues due to increased population.
- Increased communication of employment opportunities to the locals and give preference to locals for employment whenever there are qualified individuals available.

- Work to improve the educational environment in the area.
- Establish a farmers' market where local farmers can sell their produce to the IIT.
- Establish cooperatively owned businesses to provide services to the IIT community and valley.
- Address general community concerns, such as electricity, water scarcity and purity, hospital development, security and public services.

One immediate concern is we have is about raising awareness about the construction plans of the IIT. In our research, it became evident that many of the villagers were not aware of the full extent of the planned development of the campus. It is imperative that the IIT alerts village heads of the full plans as soon as possible so that they can communicate them to their villages. This is crucial to avoiding negative reactions to sudden development and to fostering a good, open relationship between the villages and the IIT. The villagers are very excited and positive about what they think the IIT will bring to them, but if sudden fast-paced construction overwhelms them this could sour their views.

Another item that the IIT would benefit from considering in the early stages of development is to continue to employ local residents. The villagers we talked to were all very adamant that the IIT should not employ workers from outside the valley unless the locals were unable to fill these positions. Villagers have also voiced concerns about not being aware of these positions. We suggest that the IIT strive to make local people aware of these positions and prioritize them for employment.

The villagers of the valley are concerned about the state of education in the region. The IIT, being an institute of higher education, has the capability of greatly contributing to the educational environment. This contribution could include tutors coming from the IIT to help the students of the government school, the IIT opening a private school, or the IIT influencing upgrades in the government schools. Beyond bettering education in the valley, the IIT can also work to inspire the local students by establish outreach programs to bring them on tours of the IIT to meet and talk with IIT students.

In our research, we found that the villagers were excited about many things. Many of these had to do with economic growth opportunities for the villagers. A majority of villagers was interested in selling their produce to the IIT and one good way to do this is to open a farmers' market. This will allow the villagers to sell more locally, getting better prices, and reducing transport, as they will no longer have to bring the bulk of their produce to Mandi. This would also benefit the IIT, as it would help them realize their goal of sustainability while providing pesticide free produce to faculty, students, and supporting staff. A farmers' market will also give an opportunity to the local fishermen to sell fish and with increase in demand for fish and increased economic benefits from fish farming, some of the fishermen may begin building ponds near the Uhl River and adopt fish farming as a full time occupation. The construction of a dam for electricity generation may also benefit, or potentially harm, the fishermen.

Another economic opportunity for the villagers would be to encourage them to establish cooperative business ventures. Because of the current economic situation in the valley, many villagers are currently without a high income or wealth. It would be necessary for them to group together to be able to start a business such as a chain store or other small business. For example, if the IIT were to encourage villagers to establish a milk cooperative, local dairy farmers could provide the bulk amount of milk required by the IIT. A cooperative system would allow many small-scale producers, who would typically be unable to meet more than a small percentage of the IIT's requirement, and therefore not receiving the IIT's business, to sell in bulk to the IIT as one cooperative seller. This also takes pressure off the sellers, as they would have a secure market in which to sell their milk.

Story from Siram Village

A woman told us that one of her relatives bought a pumpkin injected with oxytocin. At night they kept that pumpkin in the refrigerator and when they woke up in the morning, the pumpkin had grown in size and it became difficult to take it out of the refrigerator.

Finally, we feel the IIT has the ability to bring public services to the benefit everyone in the valley. This could include a hospital, post office, and bank as well as water purification systems and electricity production. We know that the IIT final plan already has some of these systems in place, but it is important that the villagers are aware of these services and are able to use them.

In our research, we also found that villagers never lock their houses or shops because they believe that it is against the integrity of their community and creates a feeling of distrust among them. However, when people from outside the region will come, there may be increase in thefts and local people will be more concerned about the security of their belongings. If the IIT implemented a security plan for the local communities, it could foster good feelings toward the IIT. For example, installing streetlights and have security guards patrolling surrounding villages at night, have the potential to induce a better sense of security among the villagers, as the security guards belong to the nearby villages, and further enhance the mutual relationship between IIT and local communities.

One asset the committee could use to address some of the concerns would be student groups. As a community service organization, the NSS (National Service Scheme) could be a perfect group to employ. Projects of this nature would not only address community concerns but also help to better connect students to the communities by working with them and getting to know their values and culture. Another student group could be the joint projects with WPI (Worcester Polytechnic Institute) and IIT Mandi students. These projects address problems that involve technology, environment, and society and could devise new technologies or other solutions to certain villager concerns. Beyond addressing the village concerns, the student groups could gather further insight into which concerns are most valuable to address. Part of every project could include making observations or there could be a project fully devoted to assessing the needs of the communities.

5.1.2 AWARENESS AND EDUCATION

Based on our findings we think that the IIT should continue to develop its already strong effort to create a sustainable campus. To have a truly sustainable campus, everyone living here needs to be at least aware of the institute's goals as well as how they play a part in contributing to the success of these goals. In this light, we feel that there is a need to educate students, faculty and staff, and construction workers. One potential method of doing this would be to employ the NSS to run interactive training programs. These could be as standard as lectures or creative as adding public service announcements to the campus radio if one is developed.

Education for the students should really focus around cultural and environmental awareness. In our student surveys and student and faculty interviews we found that there was very little knowledge about the local culture. To keep good sustainable relations with the villages the students must not offend the villagers, which they could easily do accidentally if they are unaware of local customs or taboos. One way to educate members of the IIT as well as create a healthy community relationship with the villages is to hold cultural or religious festivals on campus green space. Additionally, the institute could provide a cultural orientation program to students at the beginning of their first year.

Upon investigation, we found that students and faculty are environmentally conscious. They are aware that they should use trashcans to collect their waste so it can be properly disposed of. However, they may not be aware of other direct impacts they have, such as water pollution by using soaps and detergents. For the campus to be truly sustainable, when put up against the highest standards, each person on campus should be aware of his/her environmental impact.

While in the construction phase, the IIT should be aware of what the construction workers are doing. We found that villagers downstream from campus have identified waste from the construction workers' temporary village. We recommend that the IIT try to educate the laborers about the impact that they may have based in their actions. Beyond this, the IIT should enforce rules about disposal. For example, the IIT could investigate possible alternatives to burning construction waste. Furthermore, the IIT could consider

providing some alternative to the construction workers for disposal of their sewage waste, so that it does not continue to end up in the Uhl.

In order to develop cultural and environmental awareness in the student and faculty population, we would suggest that the NSS (National Service Scheme) implement projects in this area. These projects could center on education of students in cultural, environmental. This would be beneficial not only to the students but also to the village communities. Participating in these projects, the students would gain insight into the local cultures and customs leading them to be more aware of how their actions could affect the communities.

5.1.3 GOALS OF A SUSTAINABLE CAMPUS

In order for the IIT to meet its goals of becoming a sustainable campus fully, it should take care to ensure that it becomes sustainable in all aspects. This includes environmental, social, and economic considerations that will allow the IIT to develop sustainably. Below we listed and explained some key considerations that we feel the IIT should address. We propose that the IIT:

- Prioritize a sewage and chemical waste management system.
- Prioritize the establishment of a waste management system on campus.
- Implement systems that use water efficiently, and encourage water consciousness on the campus.
- Incorporate energy efficiency into their designs, and encourage smart electrical use.
- Work to preserve existing trees and try to avoid deforestation on the campus, to help mitigate erosion in the immediate vicinity.
- Try to buy local produce and dairy products.
- Prioritize the employment of qualified locals.
- Take care to be mindful of sacred sites located in and around campus, especially around North campus.

Water pollution and contamination prevention should continue to be a key concern for the IIT as it develops. Sewage and chemical waste entry into the watershed is damaging to both human populations and the environment. We recommend that the IIT prioritize the planned sewage treatment plant as water quality issues are already arising downstream. Since the planned sewage treatment system will incorporate a seasonal dumping of treated sewage, we feel it is important to emphasize that this only occur when sufficient water flow exists in the Nallah, during the rainy season. Even then, dumping should be minimal. Furthermore, any dumping of sewage happen only after local communities have been advised of the event so that they can plan accordingly. Additionally, monitoring the health and pollution levels in the Nallah throughout the year will be critical to preserving its ecosystem. As the campus develops, it will be important to monitor the effectiveness of the waste treatment facilities in order to ensure that harmful waste does not infiltrate the watershed.

In order to prevent environmental degradation due to solid waste pollution, the IIT's prioritization of the implementation of a waste management system would be beneficial. This could include the placement of more trash receptacles and frequent waste collection, in addition to education of students, staff, and faculty as described previously. Additionally, the IIT could collect and sell used plastic bottles and other items to the Himachal Pradesh Public Works Department for use in road construction projects.

The IIT could also pursue the integration of additional water and energy efficient features. The IIT is definitely on the right track where these considerations are concerned, with the incorporation of features such as timers on the hostel lights, switches on the outlets, water heaters that heat on demand, as well as dual flush toilets. However, the IIT could take further steps, to reduce excessive light usage in the mess, installing solar water heaters for the hostels and faculty residences, and ensuring that the source of the electricity used by campus is as environmentally and socially conscious as possible. Education, as discussed before, will be a key aspect of developing a sustainable campus.

Though the forestry department has already approved the campus development plan, preserving trees on the campus should remain a goal. Preserving many of the trees that are already on campus, and planting new indigenous trees, will help to mitigate the erosive impact of the built environment. This will help to increase the lifetime of the buildings on the campus, prevent landslides that could obstruct the watershed, and have the additional benefit of beautifying the campus.

A key step in being environmentally, socially, and economically sustainable is buying locally whenever possible. For the IIT this could include hosting a regular farmers' market and buying local produce and dairy products as already discussed. Additionally, hiring locally will create a socially and economically sustainable system where the IIT supports the local community through employment and buying power. The local communities will then improve socially and economically, creating a more attractive area around the campus, with a reduction in the percentage of poverty and unemployment.

Finally, as the IIT develops its campus, particularly on the heretofore-undeveloped North campus, it is important that they are mindful of local cultural sites. It is important that in order to maintain good relations with the surrounding community, the university does not close the road that runs through North campus. This road is the main way to travel up the hill to towns such as Khani. If this road is closed, the villagers will have to make a trip 5 kilometers out of their way to make it up or down the hill. This in and of itself could cause friction between the villagers and the university. The IIT could also make inquiries in the villages of Salgi and Khani regarding the location of sacred sites such as temples, which our research has indicated, are in existence on the North Campus according to the individuals with whom we talked. The IIT should take care not to disturb these sites as they could damage their relationships with the locals if they perceive the IIT as uncaring or disrespectful towards these sites.

5.2 CONCLUSION

This project aimed to understand potential changes and consequences for the Kamand region due to the establishment of the new IIT Mandi campus at Kamand. Beyond just fulfilling a project requirement for graduation, this project allowed for a collaborative experience between students from the IIT Mandi and WPI. Our team, half from each location, was able to bring many different viewpoints and opinions to the problem at hand. This experience was rewarding to all of the students involved.

This project, though a school requirement, was determined to create a product and recommendations that would be useful after the end of the project. Because of this goal we drew up recommendations for short and long-term interaction between the IIT and surrounding villages. Some of our recommendations also focused on enhancing the IIT's goals of sustainability, preserving the surrounding ecosystem, and addressing cultural clash.

Our project also created many openings for future joint projects. We have established a baseline of some key aspects of life in the valley. In the future, any other projects focused in this region can use this information to help them better understand the system in the valley. At this point in time, we noticed that not all of the surrounding villages have experienced an equal impact and future projects can check back on the situation in the valley, determining how or if things have changed. As the IIT Mandi continues to work towards its goal of creating a sustainable campus in the Kamand valley, it seems that the IIT is on track to becoming a model of social, economic, and environmental sustainability for institutions worldwide.

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APPENDIX A: INTERVIEW QUESTIONS

First Round Questions:

When did you first hear about the IIT? What were your initial reactions?

How do you believe the IIT will affect you in the future?

Has the business in your shop increased?

Have you noticed an increase in traffic?

What do you hope the IIT will bring to your village? Do you have any concerns?

Where does your drinking water come from?

What do you do with your waste? Have you noticed an increase in waste because of the IIT?

Did the local people use the land that the campus is now occupying?

How has the IIT affected your life?

Second Round Questions:

Do you think people will move into the area because of the IIT?

If so, how do you think this increased population will affect you?

Where does your child go to school? What do they do after they come home from school?

Are there any sacred locations around that you think the IIT might impact/threaten?

How many times do you migrate your deities?

Have you experienced any traffic concerns while travelling with your deities?

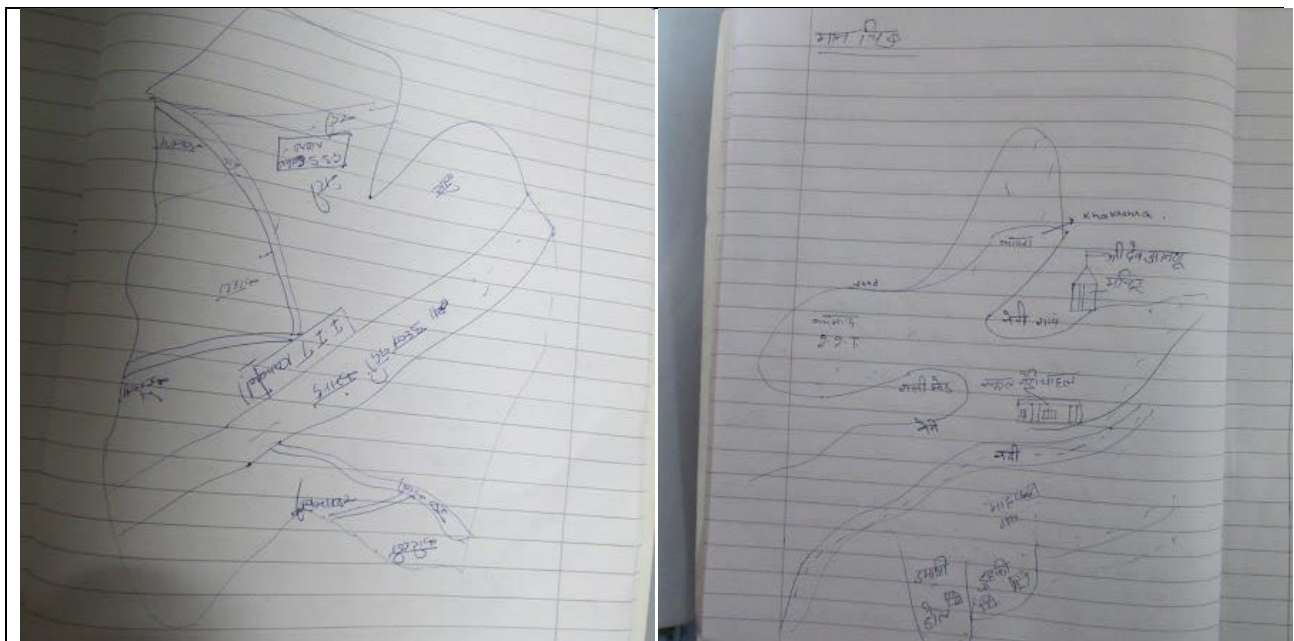
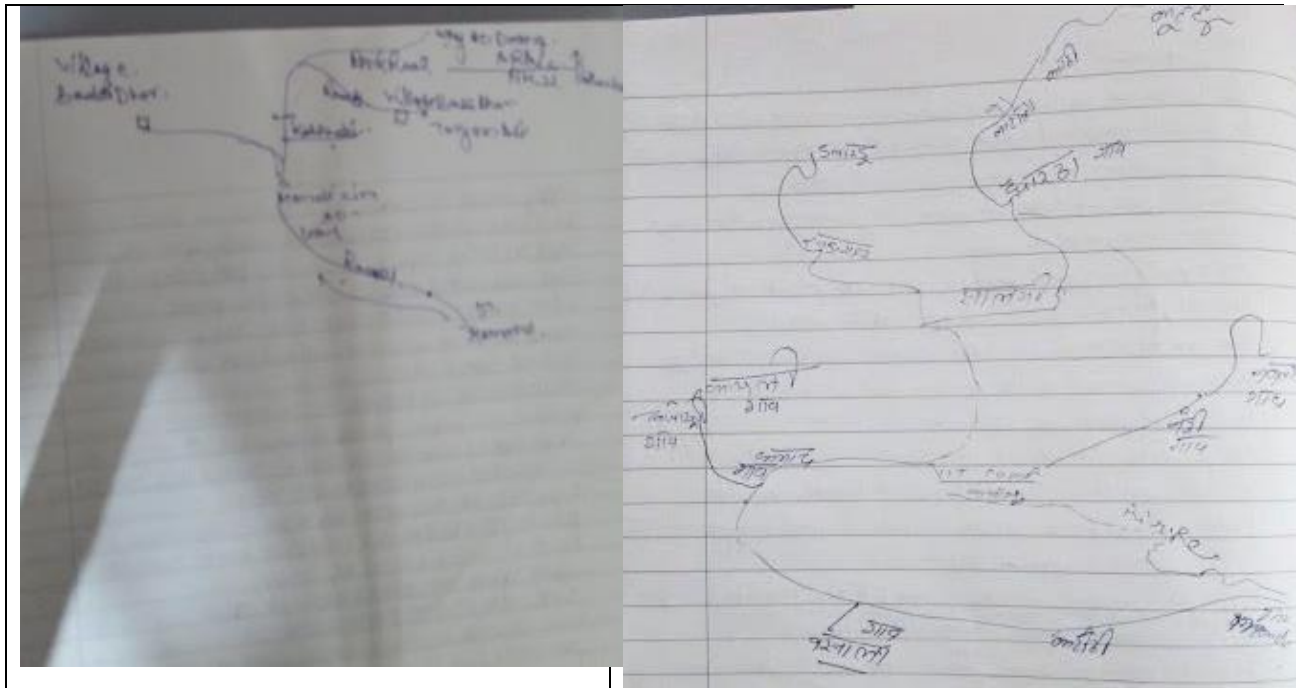
Do the local farms use pesticides?

Are you looking to expand your farm, what exactly would that entail?

Have you noticed that the wildlife have moved or been disrupted by the construction?

Can you draw a map of the area?

APPENDIX B: HAND DRAWN MAPS



These images are of the maps that a few of our interviewees drew for us. These maps were for our research in order to understand how the village people view the region. Another reason these maps were drawn was to find out if the way in which the villages were constructed holds cultural significance.

APPENDIX C: INFOGRAPHIC



APPENDIX D: POSTER

